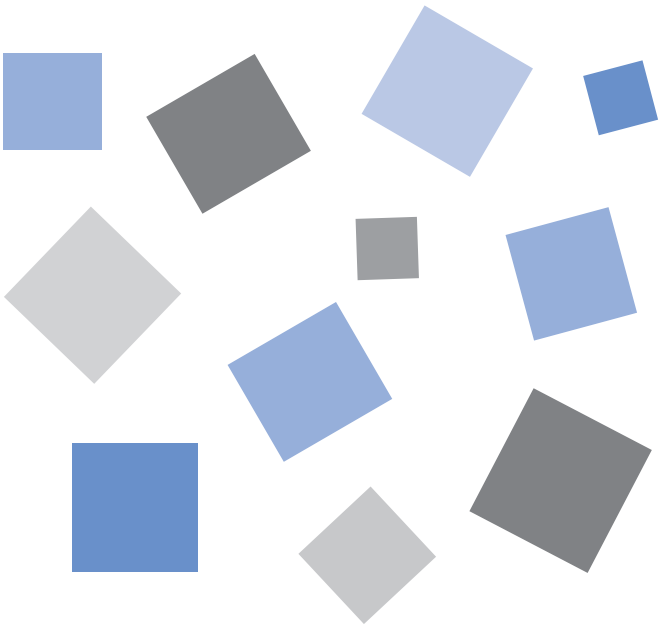
GL450

midi LOGGER

USER'S MANUAL

MANUAL NO. GL450-UM-151



GRAPHTEC

Introduction

Thank you for purchasing the GL450 midi LOGGER.
Please read this manual thoroughly before attempting to use your new product to ensure that you use it correctly and to its full potential.

Notes on Use

Be sure to read all of the following notes before attempting to use the GL450 midi LOGGER.

1. Note on the CE Marking

The GL450 complies with the EN61326 (1997+A1:1998+A2:2001 Class A) standard based on the EMC directive (89/336/EMC). It also conforms to the EN61010-1 (1993/A2:1995) standard based on the LV directive (72/73/EEC).
Although the GL450 complies with the above-mentioned standards, be sure to use it correctly in accordance with the instructions and notes provided in its User's Manual.
Moreover, use of the GL450 by incorrect procedures may result in damage to the GL450 or may invalidate its safeguards. Please confirm all of its notes regarding use and other related information to ensure correct use.

2. Warning

This is a Class A product according to the EMC directive.
In a domestic environment, this product may cause radio interference or may be affected by radio interference to the extent that proper measurement cannot be performed.

3. Notes for Safe Operation

(1) Be sure to use the Graphtec-supplied AC adapter. In environments where there is a lot of noise or where the power supply is unstable, we recommend that you ground the GL450.

(2) When a high-voltage signal cable has been connected to the main unit's analog signal input terminal, avoid touching the leads of the input terminal's signal cable to prevent electrical shock due to high voltage.

(3) Ensure that the GL450's power source is positioned so that it can easily be disconnected.

4. Notes on Functions and Performance

(1) Be sure to connect the main unit to an AC or DC power supply that conforms to the rated range. Connection to a non-rated power supply may cause the main unit to overheat and break down.

(2) Do not block the vent on the main unit.
Continued operation with the vent blocked may cause the main unit to overheat and break down.

(3) To avoid malfunctions and other damage, avoid using the GL450 in the following locations.
- Places exposed to high temperature and/or high humidity, such as in direct sunlight or near heating equipment. (Operating range - Temperature: 0 to 40°C, Humidity: 30 to 80% RH)
- Locations subject to excessive salt spray or heavy fumes from corrosive gas or solvents.
- Excessively dusty locations.
- Locations subject to strong vibrations or shock.
- Locations subject to surge voltages and/or electromagnetic interference.

(4) If the main unit becomes soiled, wipe it off using a soft, dry cloth. Use of organic solvents (such as thinner or benzene) causes deterioration and discoloration of the outer casing.

(5) Do not use the GL450 in the vicinity of other devices which are susceptible to electromagnetic interference.

(6) Measured results may not conform to the stated specifications if the GL450 is used in an environment which is subject to strong electromagnetic interference.

(7) Insofar as possible, position the GL450 input signal cables away from any other cables which are likely to be affected by electromagnetic interference.

(8) For stabilized measurement, allow the GL450 to warm up for at least 30 minutes after turning it on.

To Ensure Safe and Correct Use

- To ensure safe and correct use of the GL450, read this Manual thoroughly before use.
- After having read this Manual, keep it in a handy location for quick reference as needed.
- Do not permit small children to touch the GL450.
- The following describes important points for safe operation. Please be sure to observe them strictly.

Conventions Used in This Manual

To promote safe and accurate use of the GL450 as well as to prevent human injury and property damage, safety precautions provided in this manual are ranked into the five categories described below. Be sure you understand the difference between each of the categories.

DANGER

This category provides information that, if ignored, is highly likely to cause fatal or serious injury to the operator.

WARNING

This category provides information that, if ignored, is likely to cause fatal or serious injury to the operator.

CAUTION

This category provides information that, if ignored, could cause physical damage to the GL450.

HIGH TEMPERATURE

This category provides information that, if ignored, is likely to cause burns or other injury to the operator due to contact with high temperature.

ELECTRICAL SHOCK

This category provides information that, if ignored, is likely to expose the operator to electrical shock.

Description of Safety Symbols

The ⚠ symbol indicates information that requires careful attention (which includes warnings). The point requiring attention is described by an illustration or text within or next to the ⚠ symbol.

The ⃠ symbol indicates action that is prohibited. Such prohibited action is described by an illustration or text within or next to the ⃠ symbol.

The ❗ symbol indicates action that must be performed. Such imperative action is described by an illustration or text within or next to the ❗ symbol.

Safety Precautions

⚠ WARNING

Be sure to securely connect the GL450's power cord.

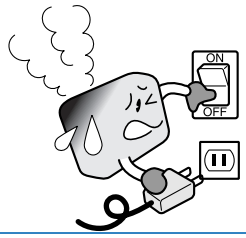
- After checking that the Power switch is turned off, connect the power cord's female plug to the GL450 and then connect its male plug into the electrical socket.
- Use of the GL450 without the power cord securely plugged into the electrical socket may result in electrical shock due to current leakage.
- Before running the GL450 using a DC power supply, be sure to ground the protective ground terminal (⏚) to avoid electrical shock and fire hazards. For grounding, use a ground wire with a diameter of at least 0.75 mm^2. When using the GL450 in an environment where grounding is not possible, ensure that the voltage to be measured is no greater than 50 V (DC or rms).

Securely connect the power cord
Make sure that the socket has a good protective ground

If the GL450 generates smoke, is too hot, emits a strange odor, or otherwise functions abnormally, turn off its power and unplug its power cord from the electrical socket.

- Use of the GL450 in such status may result in a fire hazard or electrical shock.
- After checking that smoke is no longer being generated, contact your sales representative or nearest Graphtec vendor to request repair.
- Never try to perform repair yourself. Repair work by inexperienced personnel is extremely dangerous.

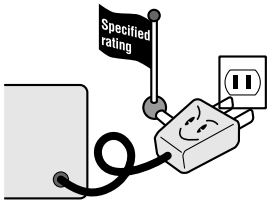
Amateur repair prohibited



Before turning on the GL450, ensure that the electric socket's supply voltage conforms to the GL450's power rating.

- Use of a different supply voltage may cause damage to the GL450 or a fire hazard due to electrical shock or current leakage.

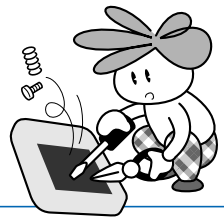
Use of a different supply voltage prohibited



Never disassemble or remodel the GL450.

- Such action may cause a fire hazard due to electric shock or current leakage.
- Contact with a high-voltage component inside the GL450 may cause electric shock.
- If repair is required, contact your sales representative or nearest Graphtec vendor.

No disassembly



Avoid using the GL450 in extremely dusty or humid places.

- Such use may cause a fire hazard due to electrical shock or current leakage.

Use prohibited

Watch out for electrical shock

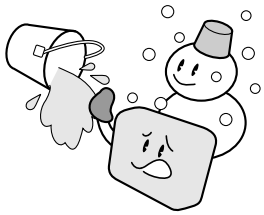
Safety Precautions

⚠ WARNING

Avoid using the GL450 in places where it may be exposed to water such as bathrooms, locations exposed to wind and rain, and so on.

Avoid water

Watch out for electrical shock

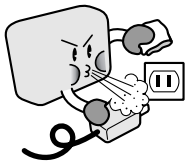


Prevent dust or metallic matter from adhering to the power supply connector.

- Adhesion of foreign matter may cause a fire hazard due to electrical shock or current leakage.

No foreign matter

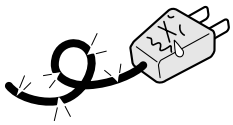
Watch out for electrical shock



Never use a damaged power cord.

- Use of a damaged cord may result in a fire hazard due to electrical shock.
- If the cord becomes damaged, order a new one to replace it.

Unplug the power cord from the socket



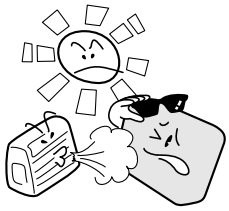
Safety Precautions

⚠ CAUTION

Do not use or store the GL450 in a location exposed to direct sunlight or the direct draft of an air conditioner or heater.

- Such location may impair the GL450's performance.

Storage/Use prohibited



Do not place coffee cups or other receptacles containing fluid on the GL450.

- Fluid spilling inside the GL450 may cause a fire hazard due to electrical shock or current leakage.

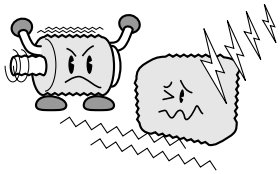
Avoid fluids

Watch out for electrical shock

Do not use the GL450 in a location subject to excessive mechanical vibration or electrical noise.

- Such location may impair the GL450's performance.

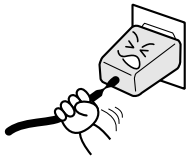
Use prohibited



To insert or disconnect the power cord or a signal input cable, grasp the power cord's plug or the signal input cable's connector.

- Pulling the cord/cable itself damages the cord/cable, resulting in a fire hazard or electrical shock.

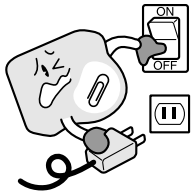
No pulling



If fluid or foreign matters enters inside the GL450, turn off the Power switch and disconnect the power cord from the electrical socket.

- Use in such status may cause a fire hazard due to electrical shock or current leakage.
- Contact your sales representative or nearest Graphtec vendor to request repair.

Unplug the power cord from the socket



Do not input voltage that exceeds the permissible input voltage range that is specified on the GL450's label.

- Exceeding the specified voltage input range may cause electrical shock or a fire hazard.

Use prohibited

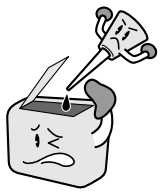
Safety Precautions

⚠ CAUTION

Do not attempt to lubricate the GL450's mechanisms.

- Such action may cause the GL450 to break down.

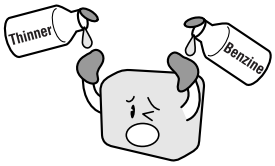
No lubrication



Never clean the GL450 using a volatile solvent (such as thinner or benzine).

- Such action may impair the GL450's performance.
- Clean off any soiled areas using a soft dry cloth.

No volatile solvents



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CHAPTER 1

General Description

This chapter provides a general description of the GL450 and its features.

1.1 Overview
1.2 Features
1.3 Operating Environment
1.4 Notes on Temperature Measurement
1.5 Notes on Using the Monitor
1.6 Changing the Display Language

1.1 Overview

The GL450 (with color monitor and internal memory) are compact, lightweight data loggers.
Both models are equipped with a PCMCIA card slot to enable the direct capture of a large volume of data to PCMCIA cards. Furthermore, the data loggers can be connected to a PC via USB or LAN to enable on-line settings, measurement, and data capture.

1.2 Features

Input

(1) The adoption of plug-in type input terminal units lets you choose amps to suit a variety of objects for measurement.

(2) The GL450 enables settings to be made using dedicated keys and interactive menus, using just one hand.

Display

(1) With the GL450's 4.7-inch STN color liquid crystal display, you can confirm the waveforms of measured data and each channel's settings at a glance.

Data Capture

(1) A large volume of measured data can be saved to a PCMCIA card.

(2) With the GL450, even after saving a large volume of data, use of the Search function lets you easily retrieve the required portion of the data.

Data Control & Processing

(1) The software provided lets you set conditions and monitor data on on a computer using the USB or TCP/IP interface.

(2) The USB drive mode function enables the PC card that is inserted in the GL450's card slot to be recognized as an external drive by your PC. (Connect the GL450 to your PC and turn on the power supply to the GL450 while holding down the [START] key.)

(3) Captured data can be read from the software to files and displayed for processing.

(4) Data can be transferred off-line to a computer using memory media (PCMCIA cards).

Modifications from the GL400

(1) USB 2.0 support

(2) Humidity measurement enabled

(3) Easy-to-read menu displays

(4) Greatly improved operability

1.3 Operating Environment

This section explains the operating environment for the GL450.

Ambient Operating Conditions

(1) Ambient temperature and humidity (the GL450 must be operated within the following ranges.)
- Temperature range: 0 to 40°C
- Humidity range: 30 to 80% RH

(2) Environment (do not use in the following locations.)
- Locations in direct sunlight or with high humidity, such as near heaters
- Locations exposed to salty air, corrosive gases, or organic solvents
- Dusty locations
- Locations subject to vibration or impact
- Locations subject to voltage surge or electromagnetic interference such as lightning or electric furnaces

(3) Installation category (over-voltage category)
- The GL450 conforms to the IEC664 installation category Ⅰ

CHECKPOINT

If condensation occurs...
Condensation occurs in the form of water droplets on the device surfaces and interior when the GL450 is moved from a cold to a warm location. Using the GL450 with condensation will cause malfunctioning. Wait until the condensation has disappeared before turning on the power.

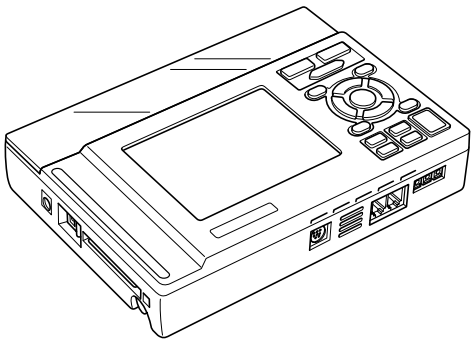
Warming-up Before Use

The GL450 should be allowed to warm up with the power turned on for approximately 30 minutes to ensure that it operates according to the specified performance.

Configuration When in Use

Do not use the GL450 standing upright or at an angle. It must always be laid flat.

Usage Configuration



⚠CAUTION

Do not block the air vent on the GL450, as this will cause malfunctioning.

1.4 Notes on Temperature Measurement

Please observe the following precautions when performing temperature measurement.

(1) Do not block the air vents. Always provide a space of at least 30 cm on all sides of the GL450.

(2) For stabilized temperature measurement, allow the GL450 to warm up for at least 30 minutes after turning it on.

(3) Exposure of the input terminals to direct drafts, direct sunlight, or abrupt changes in temperature may impair the equilibrium of the input parts and result in measurement errors. To measure temperature in such an environment, take appropriate countermeasures such as changing the installation site of the GL450.

1.5 Notes on Using the Monitor

The monitor is an LCD display unit, and so the display will vary depending on the operating environment.

CHECKPOINT

If the screen saver function is used, it will operate and clear the screen if no operations are performed during the preset time. If the screen saver operates, press any key to restore the display.

⚠CAUTION

- Condensation may form on the LCD screen if the GL450 is moved from a cold to a warm location. If this occurs, wait until the LCD screen warms up to room temperature.
- The LCD screen is manufactured to extremely high precision. Black dots may appear, or red, blue, and green dots may not disappear. Likewise, streaks may appear when viewed from certain angles. These phenomena are due to the LCD screen construction, and are not signs of a fault.

1.6 Changing the Display Language

You can choose either English, French, or Japanese as the language displayed on the screen. The default display language is set to English when the GL450 is shipped overseas. To change the display language, see the instructions in "Changing the Display Language".

CHAPTER 2

Checks and Preparation

This chapter explains how to check the GL450's external casing and accessories, and how to prepare the GL450 for operation.

2.1 Checking the Outer Casing
2.2 Checking the Accessories
2.3 GL450 Part Names and Functions
2.4 Monitor Part Names and Functions
2.5 Control Panel Key Part Names and Functions
2.6 Connecting to a PC
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2.14 Logic/Alarm Functions
2.15 Trigger/Pulse Functions
2.16 Connecting the Humidity Sensor
2.17 Setting the Date and Time

2.1 Checking the Outer Casing

After unpacking, check the GL450's outer casing before use. In particular, please check for the following:

- Surface scratches
- Other flaws such as stains or dirt

2.2 Checking the Accessories

After unpacking, check that the following standard accessories are included. The accessories included will differ depending on the model purchased.

Standard Accessories

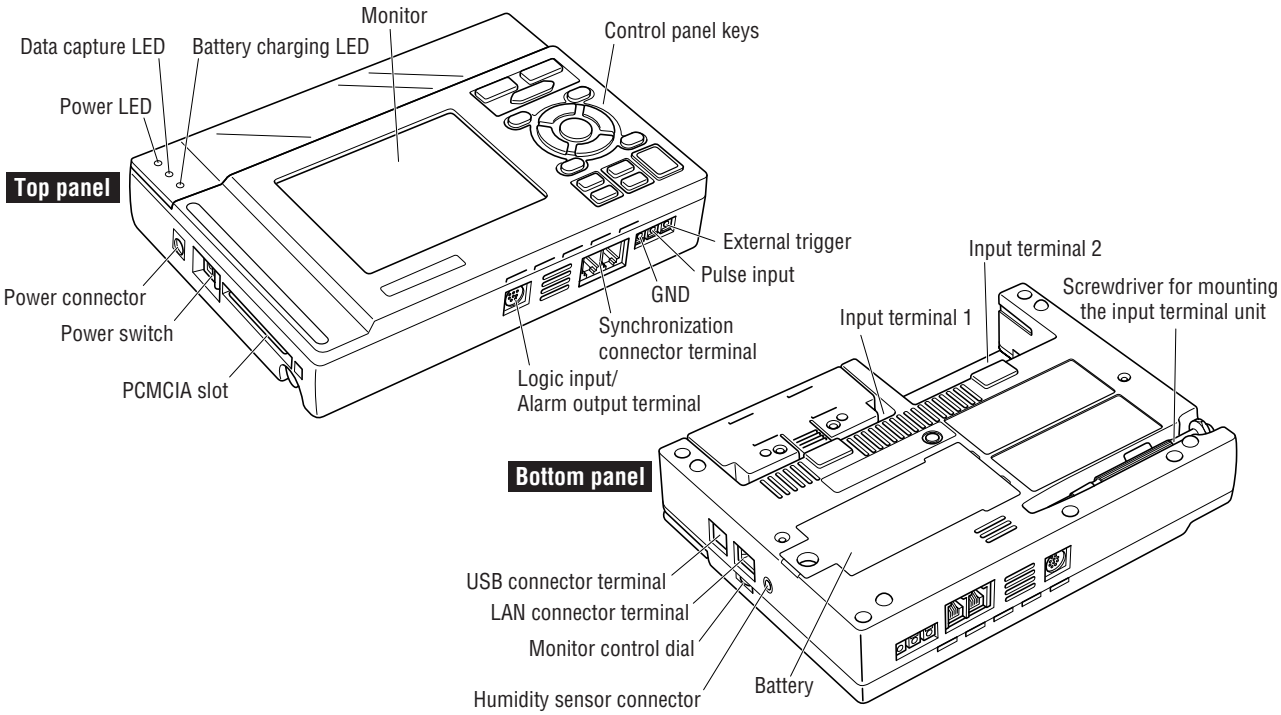
Item	Remarks	Quantity
Quick Start Guide	GL450-UM-851	1
CD-ROM	User's Manual, Application software	1
LCD Protector	For protecting the LCD surface	1
AC cable/AC adapter	100 to 240 VAC, 50/60 Hz	1
Screwdriver for input terminal unit	Fits inside the main unit	1
10-ch input terminal unit	Input terminals for 10 channels (2 input terminal units can be mounted in the main unit)	1

Optional Accessories

Item	Option No.	Remarks
10-ch input terminal unit	10TU	Input terminals for 10 channels
20-ch input terminal unit	20TU	Input terminals for 20 channels (can be mounted in the main unit)
50-ch input terminal unit	50TU	Input terminals for 50 channels (used outside the main unit)
Battery pack	B-517	
Logic/alarm cable	B-513	Bare tips (2 m)
DC drive cable	B-514	Bare tips (2 m)
Connection cable (to connect two main units together)	B-515	1-m length (for synchronized sampling during PC measurement)
T-type thermocouple	JBS-7115-5M-T	5-m length, 4 thermocouples per set
K-type thermocouple	JBS-7115-5M-K	5-m length, 4 thermocouples per set
Humidity sensor	B-350	3-m length

2.3 GL450 Part Names and Functions

This section describes the names and function of parts of the GL450



Power LED ..... This LED is lit when the power switch is in the 'On' status.

Data Capture LED ..... This LED is lit while data is being captured.

Battery Charging LED ..... This LED is lit when the battery is being charged.

Monitor ..... Displays the setting menus and measurement data.

Control panel keys ..... Used for the main operations, including settings, and starting and stopping measurement.

Power connector ..... Terminal for connecting the AC/DC power cables.

Power switch ..... Switch for turning on the power.

PCMCIA slot ..... Used for inserting the PCMCIA card.

Logic input/Alarm output terminal
..... Used for logic input and alarm output.

Synchronization connector terminal
..... Terminals for connecting and synchronizing additional GL450 units (used with the functions in OPS022).

GND terminal ..... Connects the main unit to ground.

Pulse input ..... Terminal for the measurement of pulse signals.

External trigger ..... Terminal for the input of external triggers.

Input terminal 1 & 2 ..... Used to connect the 10-, 20-, and 50-ch input terminal units.

USB connector terminal ..... Terminal for connecting the USB cable.

LAN connector terminal ..... Terminal for connecting the LAN cable.

Monitor control dial ..... Used to adjust the monitor contrast.

Humidity sensor connector .. Used to connect the power plug of the B-350 humidity sensor.

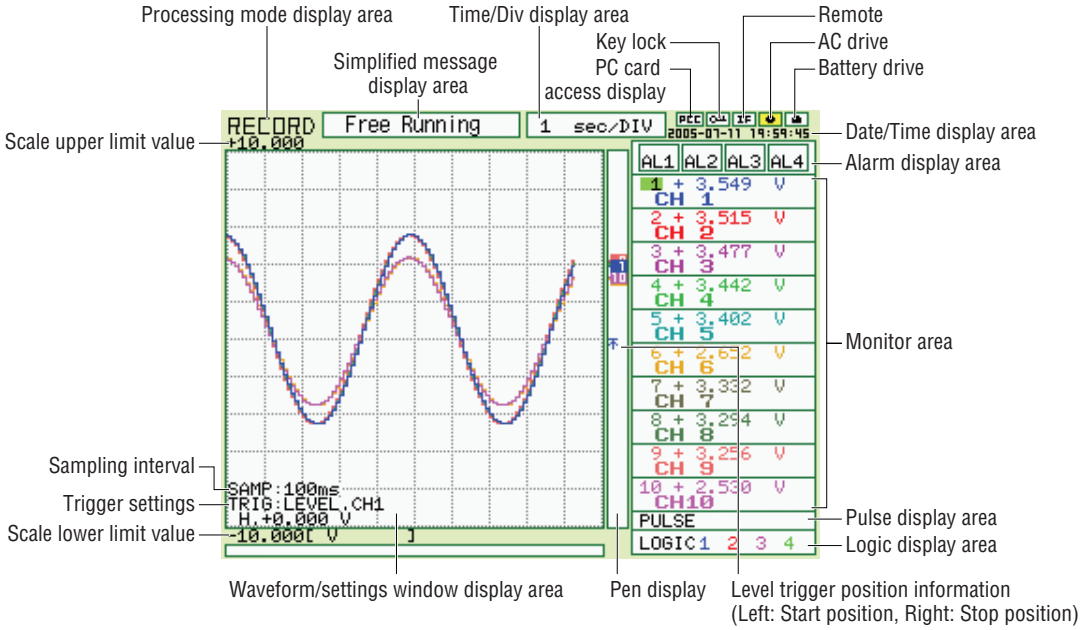
Battery ..... Backup battery used in the case of an AC or DC power failure.

Screwdriver for mounting the input terminal unit
..... Used to connect the signal input cables to the input terminal unit.

Note: Attach the LCD protector to the surface of the LCD display when you want to protect it.

2.4 Monitor Part Names and Functions

This section describes the monitor unit on top of the GL450.



Processing mode display area
..... Displays the processing mode currently set

Simplified message display area
..... Displays the system status. ("Free Running") is usually displayed. For example, "Armed" is displayed when waiting for a trigger signal.

Time/Div display area ..... Displays the current time scale.

Date/Time display area ..... Displays the current date and time.

Monitor area ..... Displays the input signal values for each channel.

Waveform settings/window display area
..... Displays the measurement signal waveforms. The menu windows are also displayed when the condition setting keys are pressed.

Scale upper limit/lower limit
..... Displays the measurement scale for the range set.

Sampling interval display .... Displays the specified sampling interval (not displayed during measurement).

Trigger settings ..... Displays the trigger information.

PC card access display ..... The display flashes while data on the PC card is being accessed.

Key lock ..... Lit when the GL450 is in key lock status. To enable key lock status, hold down the [◁◁] [▷▷] key for at least three seconds.

Remote ..... Lit when the GL450 is in remote status

AC drive ..... Lit when the AC is in use.

Battery drive ..... Lit when the battery is in use.

Pulse display area ..... Displays the measured values.

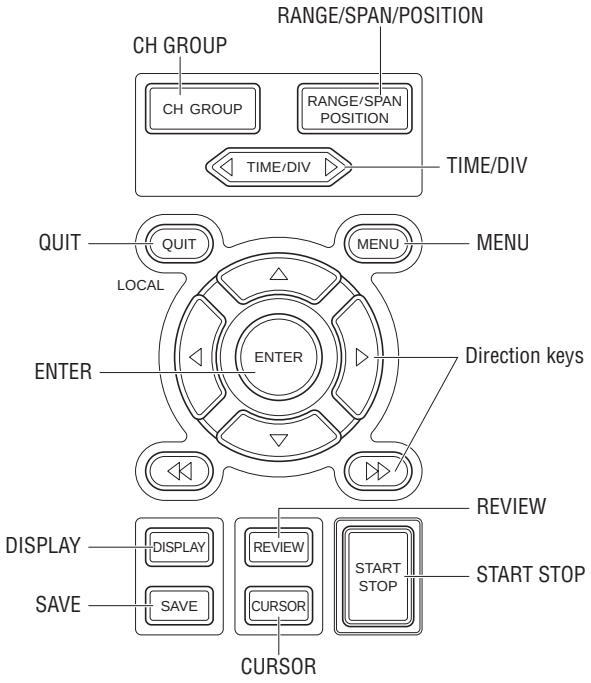
Logic display area ..... Displays the action status.

Pen display ..... Pens are displayed for each group.

Level trigger position information
..... Displays the level position of the Start and Stop triggers (Left: Start position, Right: Stop position).

2.5 Control Panel Key Part Names and Functions

This section describes the control panel keys.



CH GROUP key ..... Switches between channel groups.

RANGE/SPAN/POSITION key
..... Switches through the RANGE, SPAN, and POSITION settings on the monitor display. These settings can be specified for each channel.
Stopped status : INPUT → RANGE → SPAN → POSITION
Replay mode : TRACE → SPAN → POSITION

TIME/DIV key ..... Used to switch the time axes.

QUIT key ..... Used to cancel the displayed setting item. It is also used to cancel the REMOTE status.

MENU key ..... Switches through the various setting menus.

Direction keys (◁▷△▽) ..... These keys move the cursor on the screen in the direction indicated.

Direction keys (◁◁ ▷▷) ..... Press these keys to scroll the memory data waveforms and move the cursor. Hold down both keys together for at least three seconds to enable key lock status. To cancel key lock status, press them again for at least three seconds.

ENTER key ..... Enters the details set in the current setting window.

DISPLAY key ..... Switches through the Waveform, Enlarged Waveform, and Digital Data screens.

REVIEW key ..... Replays the captured data.

SAVE key ..... Used to save data and make a copy of the displayed screen.

CURSOR key ..... Used to switch through the Single Cursor, Dual Cursor, and Off settings.

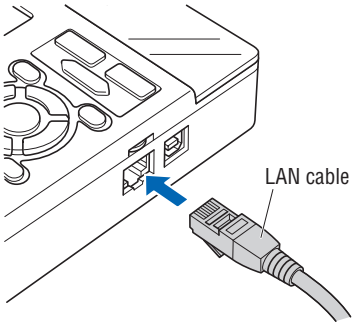
START/STOP key ..... Press this key to start measurement or to stop measurement when measurement is in progress.

2.6 Connecting to a PC

The GL450 can be connected to a PC via a LAN cable or a USB cable.

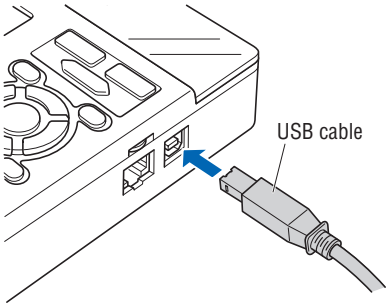
Connection Using a LAN Cable

Use the LAN cable to connect the GL450 to a PC.



Connection Using a USB Cable

Use the USB cable to connect the GL450 to a PC.



CHECKPOINT

If the USB cable is used, the USB driver must be installed in your PC. Please refer to Section 4.2 "Installing the USB Driver" for the installation procedure.

2.7 Connecting the Power Cable and Turning on the Power

This section describes how to connect the power cable and turn on the power. The connection method will vary depending on the type of power supply used.

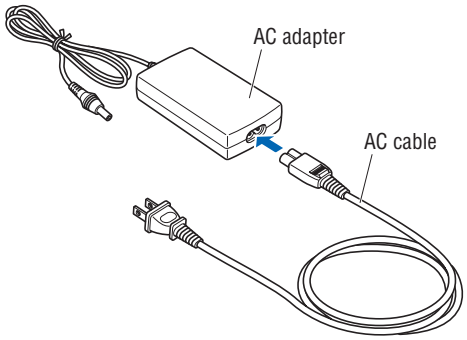
Connecting to an AC Power Supply

Use the AC cable and AC adapter that are provided as accessories.

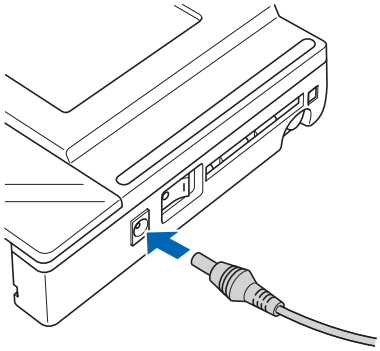
⚠CAUTION

Be sure to use the AC adapter that is supplied as a standard accessory.

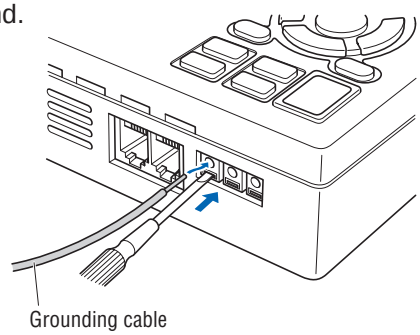
(1) Plug the AC cable into the AC adapter.



(2) Connect the output side of the AC adapter to the connector on the GL450.



(3) Using the screwdriver provided as a standard accessory, press against the button underneath the ground terminal while connecting the grounding cable to the GL450. Connect the other end of the cable to ground.



(4) Plug the AC cable into the mains power outlet.

(5) Press the power switch on the GL450 to the ON side to turn on the power.

⚠CAUTION

Always connect the GND terminal and refer to the safety precautions. The GL450 must be grounded even when connected to other devices and sharing a common ground level.

Connecting to a DC Power Supply

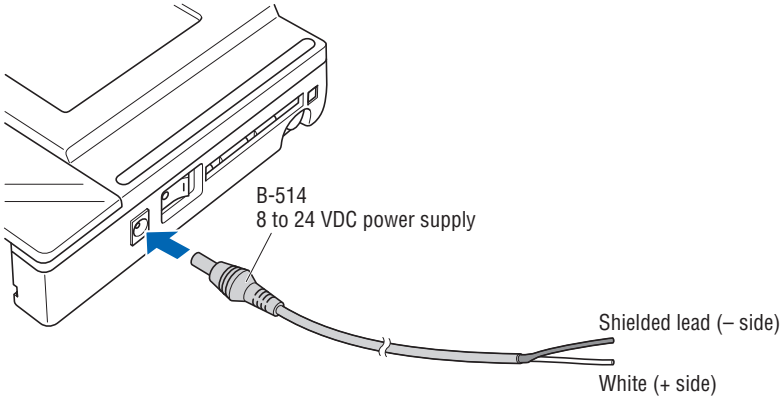
Use the optional DC drive cable (B-514).

⚠CAUTION

Use a power supply within the 8.5 to 24 VDC range.

(1) Configure the tip of the DC drive cable (B-514: 2m) to enable it to be connected to the DC power supply.

(2) Connect the DC output side to the power supply connector on the GL450.



(3) Connect the DC input side to the DC power supply.

⚠CAUTION

Be sure to check the polarity of the wire tips when performing wiring.

(4) Press the power switch on the GL450 to the ON side to turn on the power.

2.8 Using the Battery Pack (Option)

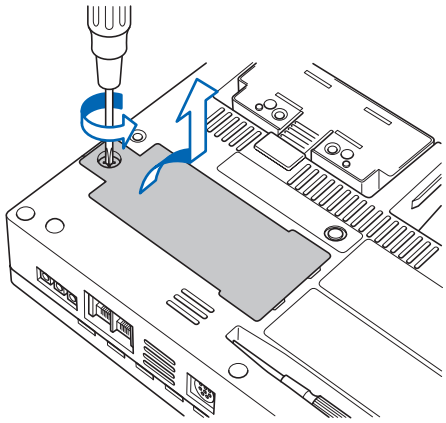
The B-517 battery is the only battery type that can be used with the GL450.
Use the battery pack for data back-up when the AC power supply is interrupted by a power failure or brownout.

Expected operating time when using the battery pack (fully charged status):

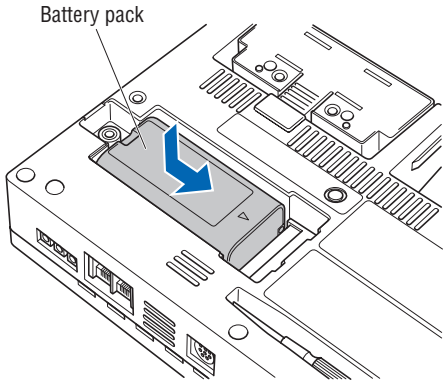
- When the LCD is ON : Approx. 2 hours
- When the LCD is OFF: Approx. 3 hours

Mounting the Battery Pack

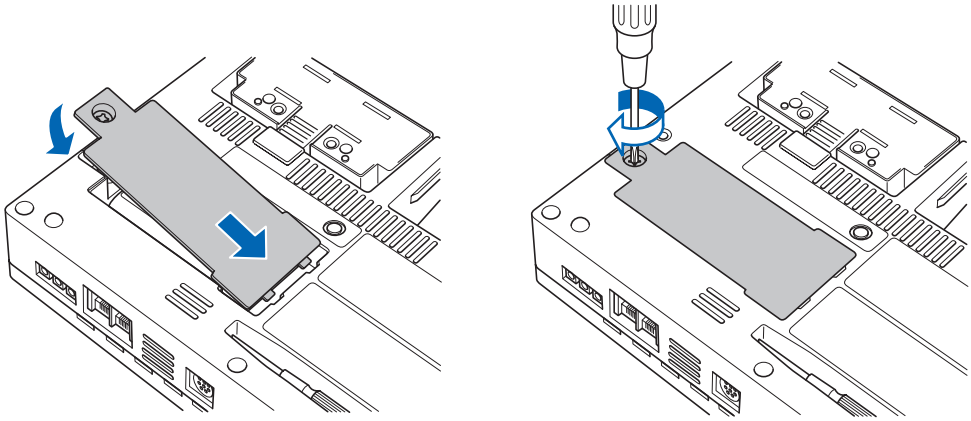
(1) Use a screwdriver to remove the battery pack cover from the bottom panel.



(2) Mount the battery pack in the direction shown by the arrow.



(3) Reattach the cover, and fasten the screw in place.



Charging the Battery

Expected time required for charging:

• Approx. 4 hours

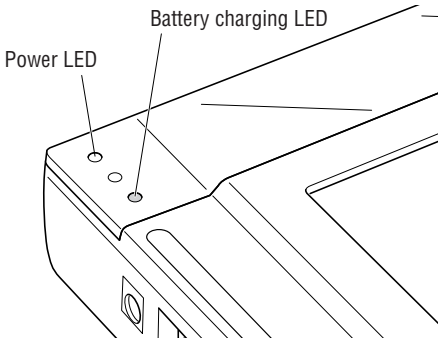
Using the GL450 for Charging

The battery pack is charged by mounting it in the GL450, and supplying it with AC power.

(1) Mount the battery pack in the GL450 (see the previous section for the mounting procedure).

(2) Turn on the power to the GL450. (Please see Section 2.7, "Connecting the Power Cable and Turning on the Power").

(3) The battery charging LED lights.



CHECKPOINT

- If battery charging is attempted immediately after the GL450 has been used continuously, charging may not be performed. However, charging will start automatically as soon as the GL450 has cooled down.
  Charging temperature: 15 to 35°C
- If input is being made directly from the DC power supply instead of the AC adapter, the DC voltage must be at least 16V.

2.9 Inserting and Removing a PCMCIA Card

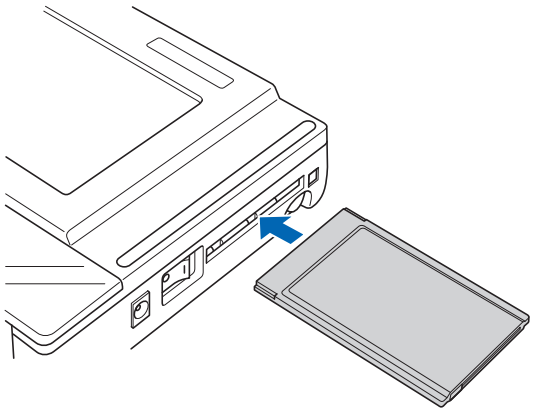
This section describes how to insert a PCMCIA card.

⚠CAUTION

Adequate precautions against static electricity must be taken when handling PCMCIA cards.

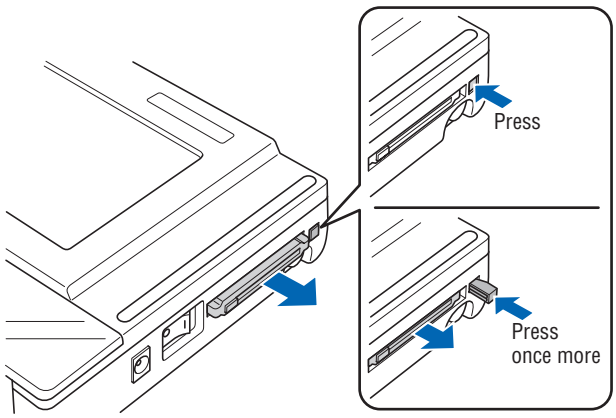
Inserting a PCMCIA Card

Insert the PCMCIA card into the slot as far as it will go.



Removing a PCMCIA Card

Press the eject button next to the PCMCIA card slot so that the button protrudes. Press it once more to eject the PCMCIA card.



2.10 Mounting and Removing the Input Terminal Unit

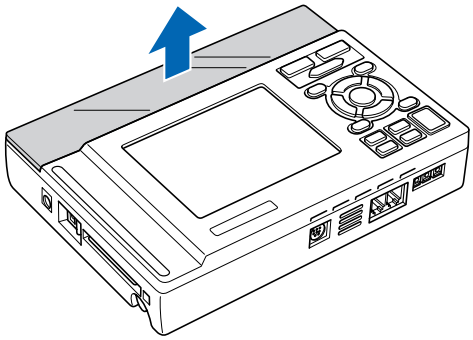
This section describes how to mount and remove the input terminal unit.

⚠CAUTION

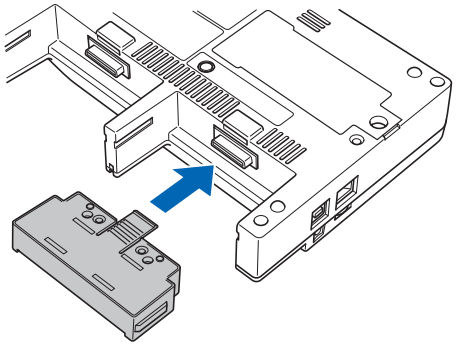
Make sure that the power supply has been turned off before mounting or removing the input terminal unit.

Mounting the Input Terminal Unit

(1) Remove the cover from the input terminal mounting area.



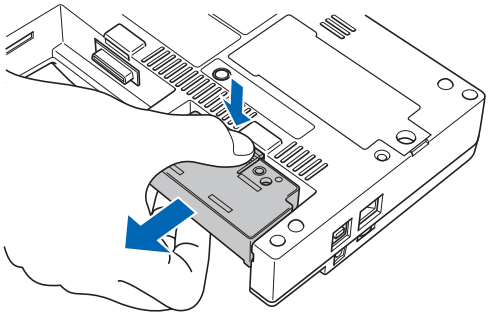
(2) As shown in the figure below, insert the input terminal unit in the GL450. At this time, be sure to check that the terminal unit is locked onto the connector.



Removing the Input Terminal Unit

(1) Remove the cover from the input terminal mounting area.

(2) Press down on the lock button while pulling the input terminal unit towards you. At this time, grip the input terminal unit firmly while removing it.



(3) Replace the cover for the input terminal mounting area.

2.11 Connecting the Signal Input Cables to the Input Terminal Unit

This section describes how to connect the signal input cables to the input terminal unit.

Input Terminal Unit Types

There are three types of input terminal unit:

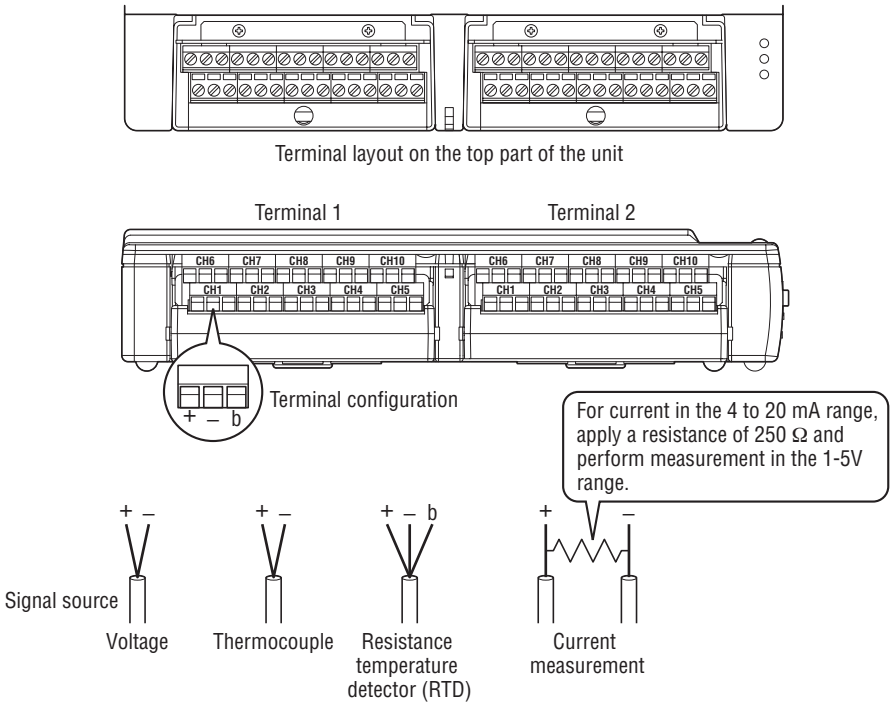
- 10-channel input terminal unit (mounted in the GL450) : 10TU
- 20-channel input terminal unit (mounted in the GL450) : 20TU
- 50-channel input terminal unit (used outside the GL450) : 50TU

Note: Each of these input terminal units has been designed for use with the GL450 model only.

CHECKPOINT

These input terminal units are for use with the GL450 model only. Moreover, input terminal units designed for other models cannot be used with the GL450.

Terminal Configuration and Signal Types


Terminal layout on the top part of the unit
Terminal 1
Terminal 2
CH6 CH7 CH8 CH9 CH10
CH1 CH2 CH3 CH4 CH5
+ – b
Terminal configuration
For current in the 4 to 20 mA range, apply a resistance of 250 Ω and perform measurement in the 1-5V range.
Signal source
Voltage
Thermocouple
Resistance temperature detector (RTD)
Current measurement

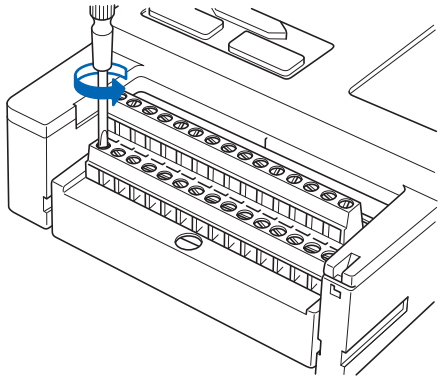
+ ..... High-voltage terminal (terminal for high-voltage input signals)
– ..... Low-voltage terminal (terminal for low-voltage input signals)
b ..... Terminal used for RTDs only

Item	Description
Input configuration	Isolated input, scanning
Analog voltage	20, 50, 100, 200, 500 mV/F.S.; 1, 2, 5, 10, 20, 50 V/F.S.; 1-5V
Thermocouples	K, J, E, T, R, S, B, N, W (WRe 5-26)
Resistance Temperature Detector	Pt100, JPt100
Sampling interval*1	100, 200, 500 ms; 1, 2, 5, 10, 20, 30 s; 1, 2, 5, 10, 20, 30 min; 1 h
A/D resolution	16-bit
Filter	On, Off (software filter)

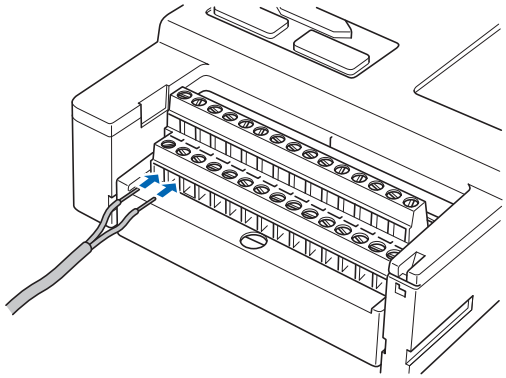
1 The maximum sampling interval will depend on the number of channels being used.

Attaching the Input Cable

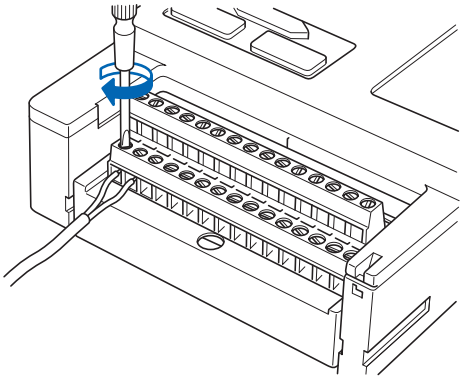
(1) Use the supplied screwdriver to loosen the terminal screw.



(2) Insert the cable tips into the terminal to be used.



(3) Use the supplied screwdriver to tighten the terminal screw.



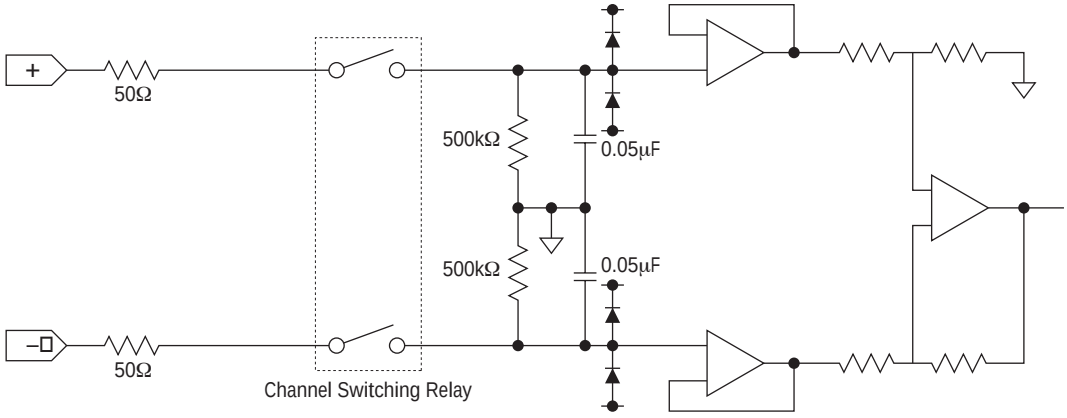
2.12 Precautions to Observe When Performing Measurement

Please be sure to read the following carefully in order to prevent electric shocks or shorts.

⚠DANGER

- Do not input voltages exceeding 30 VAC rms or 60 VDC to any of the individual analog input sections or between the analog input section and the main unit.
- Be sure to use only the AC adapter provided as a standard accessory. The rated power supply range for the adapter is 100 to 240 VAC, and the rated frequency is 50/60 Hz. Do not use any other voltages.

Input Circuit Diagram for Analog Input (Voltage, Thermocouples)



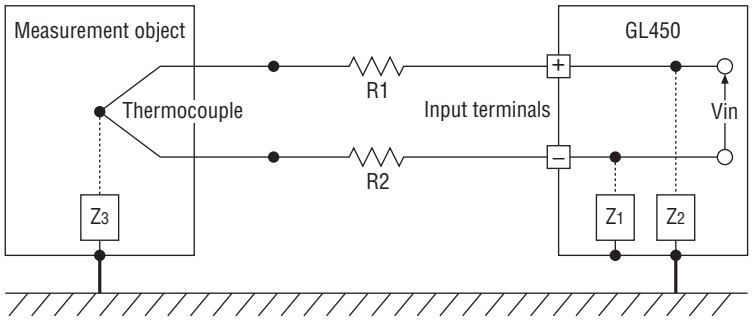
⚠CAUTION

Capacitors have been incorporated into the input circuit to increase the noise elimination capability. After voltage measurement, when the inputs have been disconnected, there will still be some electric charge remaining. Before starting another measurement operation, short-circuit the + and - terminals to enable self-discharge.

2.13 Noise Countermeasures

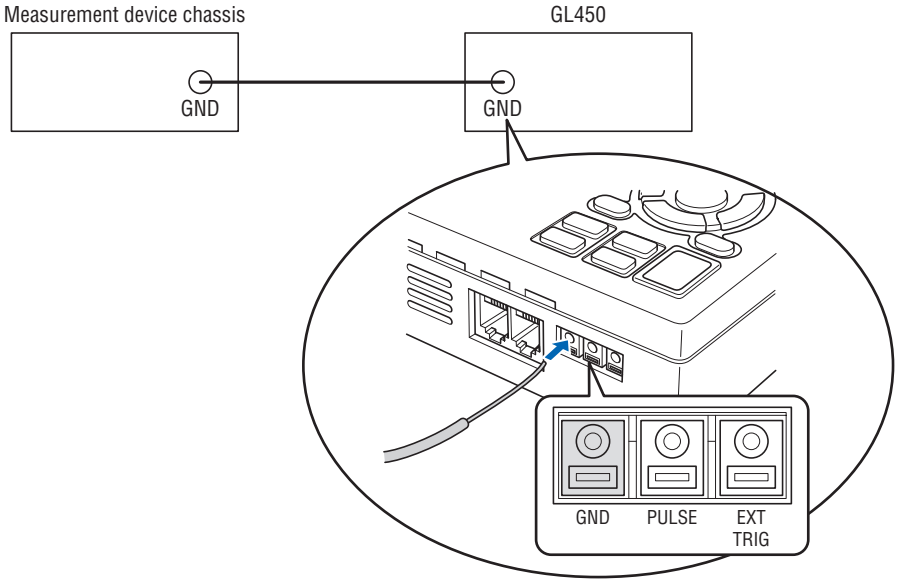
Be sure to connect the chassis GND of the object to be measured.

Ensure that the chassis GND wire of the measurement object is connected to a good ground.



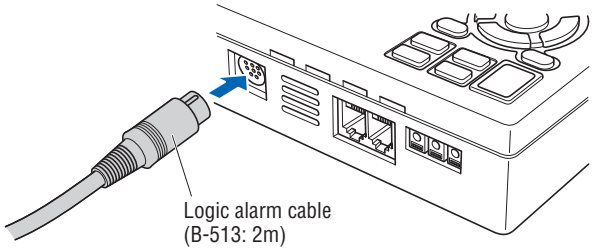
Connect the signal chassis GND and the measurement device chassis ground.

Use a short, thick lead to connect the chassis GND of the measurement object to the GL450's chassis GND. It will be even more effective if the ground potentials are the same.



2.14 Logic/Alarm Functions

Connect the round connector of the logic alarm cable (B-513, option) to the logic Input/alarm output terminal on the GL450.



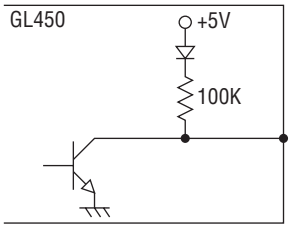
Logic Functions

Item	Description
Number of channels	4
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	+2.5V
Hysteresis	Approx. 1 V (+2 to +3 V)

Alarm Functions

Item	Description
Number of channels	4
Maximum rating	VCEO (voltage between connector and emitter): 30V IC (connector current): 0.5A

Alarm Output Circuit



Maximum rating

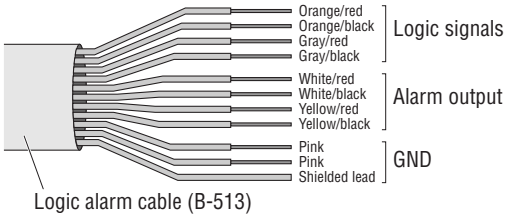
VCEO (voltage between connector and emitter): 30V
IC (connector current): 0.5A

Note: Be sure to not to exceed the maximum ratings

Wiring

The cables have bare tips. Please perform wiring as required.

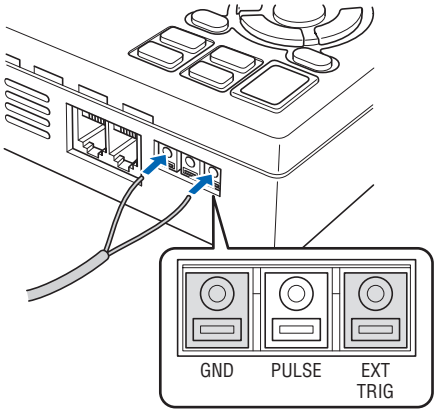
Item	Number	Lead Color
Logic signal	1	Orange/red
	2	Orange/black
	3	Gray/red
	4	Gray/black
Alarm output	1	White/red
	2	White/black
	3	Yellow/red
	4	Yellow/black
Common ground	GND	Pink
	GND	Pink
	GND	Shielded lead



2.15 Trigger/Pulse Functions

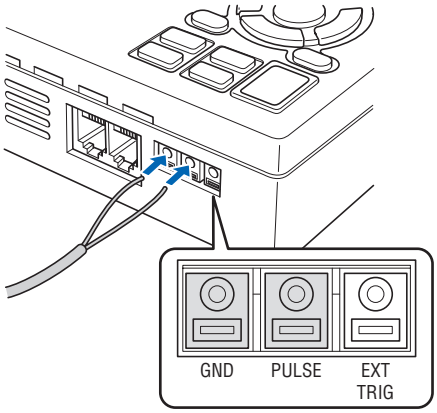
External Trigger Functions

Item	Description
Number of channels	1
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	+2.5V
Hysteresis	Approx. 0.5 V (+2.5 to +3 V)



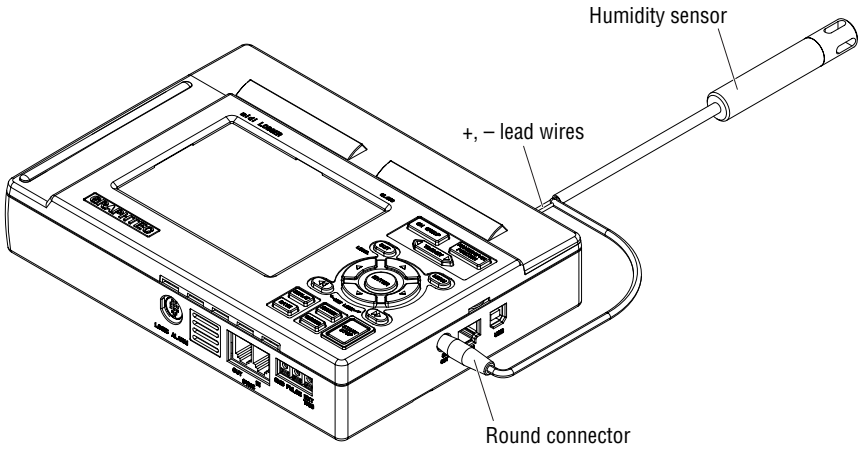
Pulse Functions

Item	Description
Number of channels	1
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	+2.5V
Hysteresis	Approx. 0.5 V (+2.5 to +3 V)



2.16 Connecting the Humidity Sensor

Connect the + and - lead wires of the humidity sensor (the B-530 option) to the desired terminals, and then insert the round connector into the 5V OUT connector on the GL450.



2.17 Setting the Date and Time

If you are using the GL450 for the first time, charge the internal rechargeable battery and then make the date and time settings.

⚠CAUTION

If the GL450 is not used for a period of approximately three months, the internal rechargeable battery may be discharged and the date and time may revert to the initial settings. If this happens, recharge the battery before using the GL450.

How to Recharge the Rechargeable Battery

Using the AC adapter provided, connect the GL450 to a mains power outlet, turn on the power switch, and then leave the GL450 connected for at least 24 hours.

How to Set the Date and Time

Press the [MENU] key, display the "OTHR" screen, and then set the date and time at the Date/Time Settings sub-menu. For details, see "Date/Time" on page 3-26.

CHAPTER 3

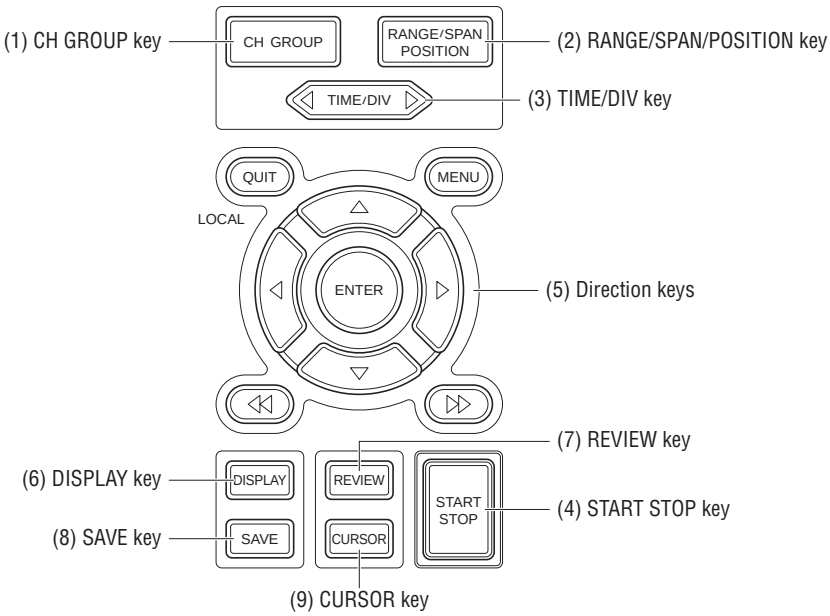
Settings and Measurement

This chapter describes the setting and measurement procedures for the GL450.

3.1 Basic Settings and Measurement
3.2 Detailed Settings and Measurement
3.3 Data Replay

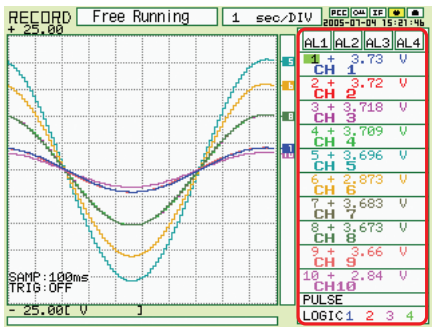
3.1 Basic Settings and Measurement

With the GL450, control panel keys are provided for easy measurement.

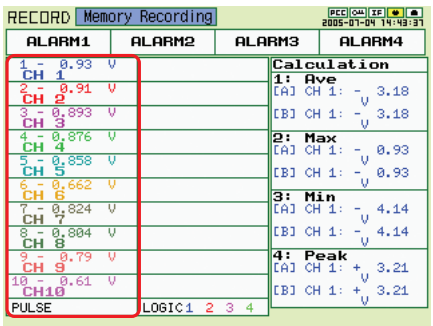


(1) CH GROUP key

This key selects the channels in 10-channel groups. Press the key to move to the next group of 10 channels. The number of channels varies according to the type of input terminal unit installed.



Waveform + digital



Digital

(2) RANGE/SPAN/POSITION key

These settings can be made or changed for each channel individually, even while the GL450 is running or performing measurement.

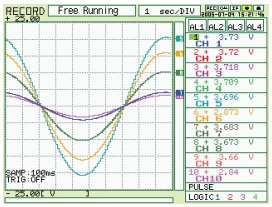
CHECKPOINT

The monitor is used for monitoring the measurement status only, and its settings cannot be changed. In addition, the RANGE setting can only be changed if data has not been captured.

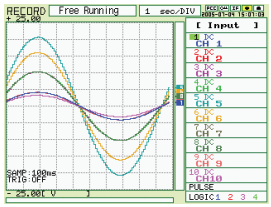
Selecting the Items

Press the RANGE/SPAN/POSITION key to switch from one setting screen to the next.

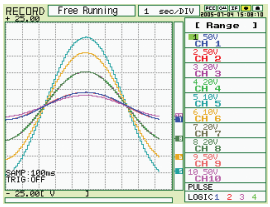
Waveform + Digital (for monitoring measurement only) → INPUT (only when data has not been captured) → RANGE (only when data has not been captured) → SPAN → POSITION



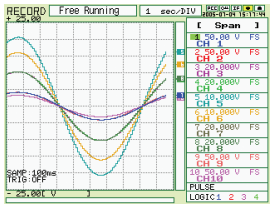
Waveform + Digital



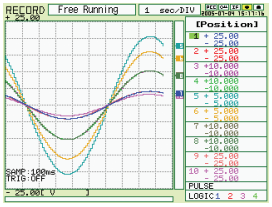
INPUT



RANGE settings



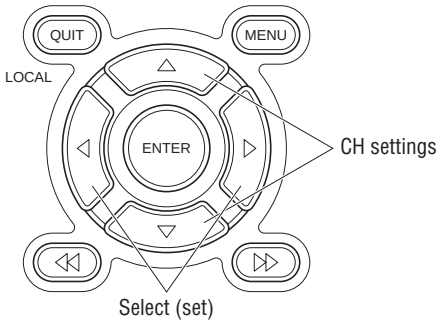
SPAN settings



POSITION settings

Setting Procedure

Use the direction keys to move to the setting item and to make selections (settings).



INPUT settings

OFF, Voltage, Temperature, Humidity

RANGE settings

The voltage and temperature settings vary according to the settings made in MENU (AMP).

- **Voltage**

20 • 50 • 100 • 200 • 500 mV • 1 • 2 • 5 • 10 • 20 • 50 • 1–5 V

- **Temperature**

TC-K • TC-J • TC-T • TC-R • TC-E • TC-B • TC-S • TC-N • TC-W • Pt100 • JPt100

SPAN settings

Voltage	20 mV	0.200 to 40.000 mV/F.S.	2 V	0.0200v4.000 V/F.S.
	50 mV	0.50 to 100.00 mV/F.S.	5 V	0.050 to 10.000 V/F.S.
	100 mV	1.00 to 200.00 mV/F.S.	10 V	0.100 to 20.000 V/F.S.
	200 mV	2.00 to 400.0 mV/F.S.	20 V	0.200 to 40.000 V/F.S.
	500 mV	5.0 to 1000.0 mV/F.S.	50 V	0.50 to 100.00 V/F.S.
	1 V	0.0100 to 2.0000 V/F.S.	1-5 V*1	0.040 to 4.000 V/F.S.
Temperature*2		50.0 to 2200.0 °C/F.S.		

**1 When 1-5V has been specified and the range is changed, it becomes a ± range. If the 1-5V range is required, please select 1-5V for the range setting once again.*

**2 With the temperature ranges, the measurement range will depend on the type of sensors used. If you want to make detailed settings, please set the range again.*

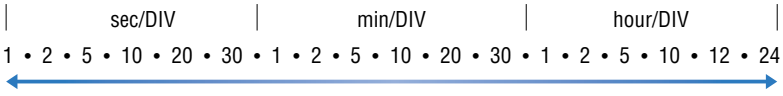
POSITION settings

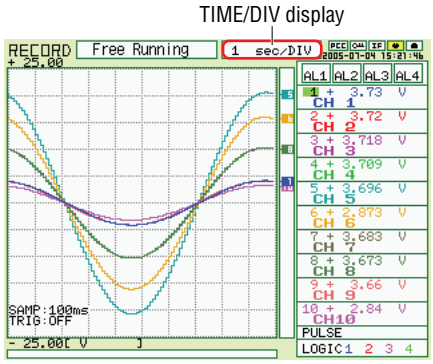
If the ENTER key is pressed when POSITION has been selected, the position can be moved.

Voltage ranges: In 10% units of the range
Temperature ranges: In 10% units of the following ranges:
50.0, 100.0, 200.0, 500.0, 1000.0, 2000.0

(3) TIME/DIV key

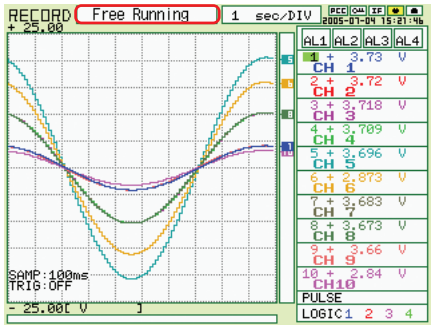
Press the TIME/DIV key to switch through the waveform display speeds.





(4) START/STOP key

Press the START/STOP key to select the START status (Armed). Press it once again to select the STOP status (Free Running).



(5) Direction keys

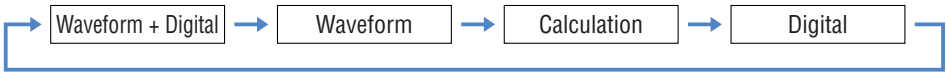
Direction keys (◁▷△▽) ..... These keys move the cursor on the screen in the direction indicated.

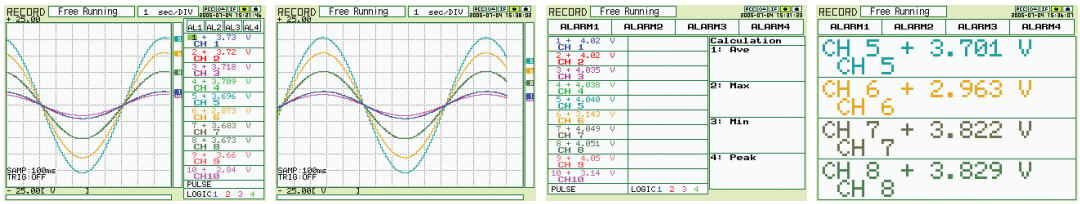
Direction keys (◁▷) ..... Press these keys to scroll the memory data waveforms, move the cursor, and specify the position of input values on menu screens.

Direction keys (◁◁ ▷▷) ..... Press these keys to scroll the memory data waveforms, move the cursor, to move the position during key lock status and for text settings.

(6) DISPLAY key

Press this key to switch through the measurement modes: Waveform/Digital, Waveform, Calculation, Digital, and the RECORDER display screens.



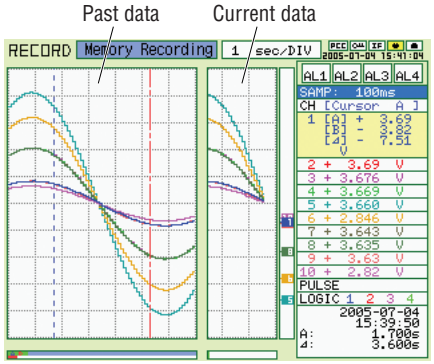


Waveform + Digital **Waveform** **Calculation** **Digital**

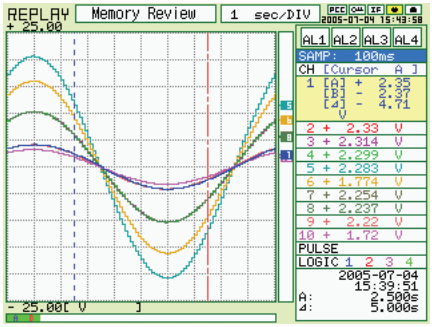
Waveform + Digital Screen : Both waveform and digital data are displayed together.
Waveform Screen : Only waveforms are displayed over the entire screen.
Calculation Display Screen : Digital data and the calculation results are displayed.
Digital Screen : The digital values for four channels are displayed.

(7) REVIEW key

Press the REVIEW key during measurement for a dual-screen display of past data alongside the current data.

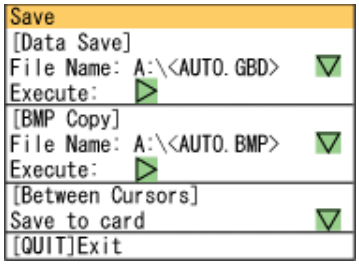


If the REVIEW key is pressed during the Free Running status (when data is not being captured), the captured data is replayed.



(8) SAVE key

Press the SAVE key to save data (the data being replayed), and to make a copy of the screen.



Data Save : When a file name is selected, the data save destination is displayed, and the data can be saved by specifying the following parameters:
- File format : GBD, CSV
- File name append method: Auto (Specify folder name), User (specify file name)

BMP Copy: When a file name is selected, the bitmap save destination is displayed, and the displayed screen can be saved in bitmap format by specifying the following parameter:
- File name append method: Auto (Specify folder name), User (specify file name)

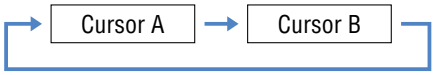
Save Data Between Cursors (during data replay only):
When captured data is replayed, the data between cursors can be saved by specifying the following parameters:
- File format: GBD, CSV
- File name append method: Auto (Specify folder name), User (specify file name)

⚠CAUTION

Data can only be saved when there is a PCMCIA card inserted in the card slot.
Data saved to the internal memory will be deleted when the GL450 is turned off.

(9) CURSOR key

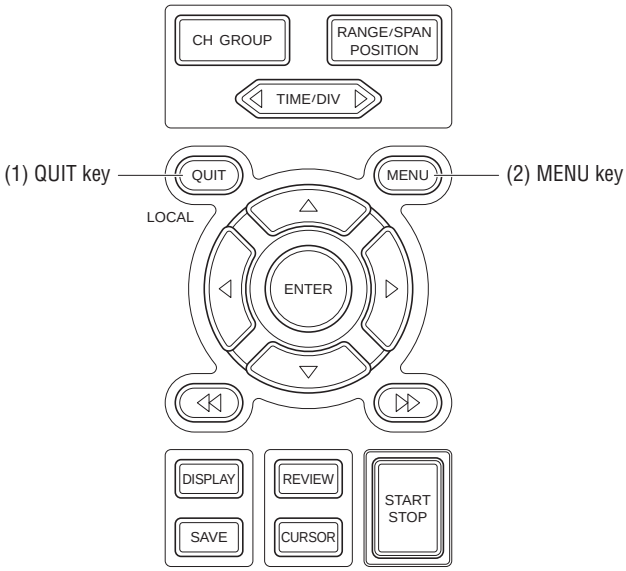
When the REVIEW key has been pressed and the replayed data is displayed, the cursor key can be used to select three cursor modes.



A: 1 cursor is moved.
B: 1 cursor is moved.

3.2 Detailed Settings and Measurement

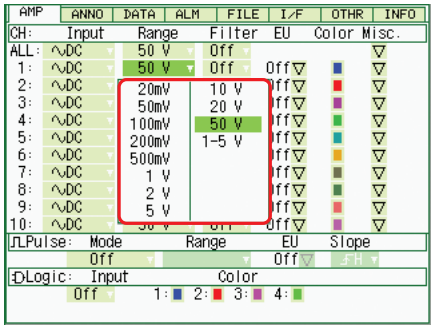
The QUIT and MENU keys enable detailed settings to be made.



(1) QUIT key

Use the [QUIT] key for operations such as the ones described below.

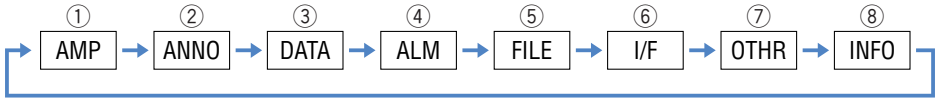
- To switch from a menu screen to a measurement screen.
- To close the selected screen.
- To exit the captured data replay screen.

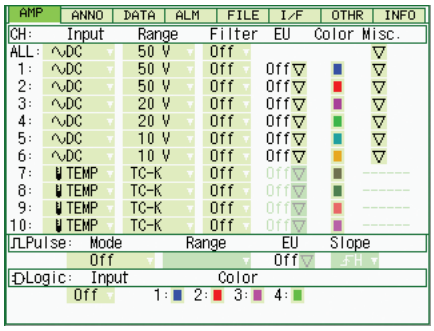


- To perform quit operations as instructed by messages displayed in the menus.

(2) MENU key

Press the MENU key to switch through the AMP, ANNO, DATA, ALM, FILE, I/F, OTHR and INFO setting menus. It can also be used to confirm details.





① AMP Settings Window

AMP Menu Structure

Setting		Selections available	Setting method
Input		Off, Voltage, Temperature, Humidity Humidity: (CAUTION: The voltage is compulsorily set to 1V, and the scaling function set to ON.	ENTER→Select→ENTER
Range		Voltage: 20, 50, 100, 200, 500 mV 1, 2, 5, 10, 20, 50, 1-5 V Temperature: TC-K, TC-J, TC-T, TC-R, TC-E, TC-B, TC-S, TC-N, TC-W, Pt100, JPt100	ENTER→Select→ENTER
Filter		Off, On	ENTER→Select→ENTER
EU (Scaling settings)	Function(EU)	Off, On (effective when On has been selected)	ENTER→Select→ENTER
	Lower Setting – Value – Upper Unit	Settings	
		• Meas. Value (Upper/Lower)	ENTER→Set numeric value→ENTER
		• EU Value (Upper/Lower)	ENTER→Set numeric value→ENTER
		• Dec pt	ENTER→Select→ENTER
		• Unit	ENTER→Select→ENTER
		• Select	ENTER→Select→ENTER
	Register		ENTER
Color		Current Color, Sel Color	ENTER→Select→Register
Misc.		Zero voltage adjustment • Perform Auto Zero ADJ. • Reset Auto Zero ADJ. [Zero point voltage value]	Press ENTER to execute
Misc (only when ALL has been selected)		Span All Settings • Upper/Lower	ENTER→Set numeric value→ ENTER→Execute
Pulse	Mode	OFF, Revol., Counts, Inst.	ENTER→Select→Register
	Range	Revol.: 500, 5k, 50k, 500k RPM/F.S. Counts: 50k, 500k, 5M, 50M, 500M C/F.S. Inst.: 50k, 500k, 5M, 50M C/F.S.	ENTER→Select→ENTER
	EU	Function: Off, On • Scaling settings • Setting values • Unit settings • Unit	ENTER→Select→ENTER ENTER→Select→Register (Use direction keys to select numeric value)
	Slope	H, L	ENTER→Select→ENTER
Logic	Logic	Off, On	ENTER→Select→ENTER
	Color specification	Specified color	ENTER→Select→Register

CHECKPOINT

When the CH setting is ALL, the Input, Range and Filter settings are the same for all the channels in that group.

Input ..... Selects the input condition.
Off: No signal input is accepted.
Voltage: Used for measuring direct-current voltage.
Temperature: Used for measuring temperature.
Humidity: Used for measuring humidity.

Range ..... Specifies the range of signal input to be measured.
Voltage: 20, 50, 100, 200, 500 mV
1, 2, 5, 10, 20, 50, 1-5 V
Temperature: TC-K, TC-J, TC-T, TC-R, TC-E, TC-B, TC-S, TC-N, TC-W, Pt100, JPt100

Available SPAN Settings
<Voltage Ranges>

Range	Maximum SPAN		Minimum SPAN	
	Lower to Upper SPAN [mV]	Lower to Upper SPAN [V]	Upper SPAN minus Lower SPAN	
1		–1.1000 to +1.1000		10 mV
2		–2.2000 to +2.2000		20 mV
5		–5.500 to +5.500		50 mV
10		–11.000 to +11.000		100 mV
20	–22.000 to +22.000	–22.000 to +22.000	0.2 mV	200 mV
50	–55.00 to +55.00	–55.00 to +55.00	0.5 mV	500 mV
100	–110.00 to +110.00		1.0 mV	
200	–220.00 to +220.00		2.0 mV	
500	–550.0 to +550.0		5.0 mV	

<Temperature Ranges>

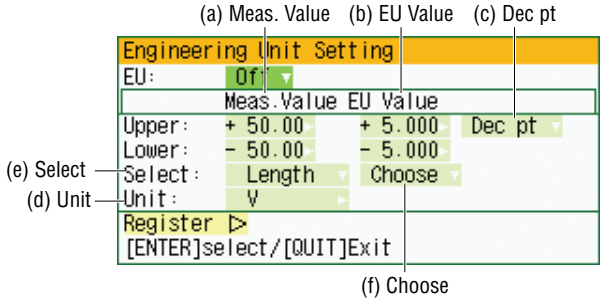
Range	Maximum SPAN	Minimum SPAN
	Lower to Upper SPAN	Upper SPAN minus Lower SPAN
K	-200.0 to +1370.0	50°C
J	-200.0 to +1100.0	50°C
T	-200.0 to +400.0	50°C
R	0.0 to +1600.0	50°C
E	-200.0 to +800.0	50°C
B	600.0 to +1820.0	50°C
S	0.0 to +1760.0	50°C
N	0.0 to +1300.0	50°C
W	0.0 to +2315.0	50°C
PT100	-200.0 to +850.0	50°C
JPT100	-200.0 to +500.0	50°C

<Humidity Range>
Fixed to 1V

Filter ..... Sets the filter status. Please set the filter to ON when there is likely to be noise in the input.
Off, On

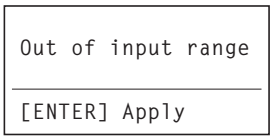
EU ..... Scales the measured values and converts them to other units.
Function (EU): Sets the EU function to Off or On.

Lower - EU - Upper Unit:
Sets the EU function's conversion value and unit. If the ENTER key is pressed here, the following window is displayed.



CHECKPOINT

The Scaling operation is calculated using a ratio of the Meas. Value or EU Output Value settings. If a ratio value that the GL450 cannot process is specified, the message below appears.



If this message appears, follow the instructions by reducing the number of digits to be output by one, or leaving the number of digits as is and changing the EU value.

(a) Meas. Value
Specifies the numeric value to be converted. Set two points, the Upper and Lower parameters.

(b) EU Value
Specifies output after conversion. Set two points, the Upper and Lower parameters.

(c) Dec pt
This parameter specifies the decimal point position of the numeral to be specified as the EU value(s).

(d) Unit
Selects the converted unit, which can be specified as a user-defined character string consisting of alphanumerics. The Unit parameter can also be specified by selecting the Select Unit setting.

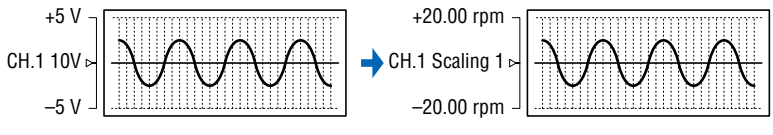
(e) Select
Selects the type of engineering unit.

(f) Choose
Selects the converted unit. The Unit displayed here is the type of unit selected by the Select setting.

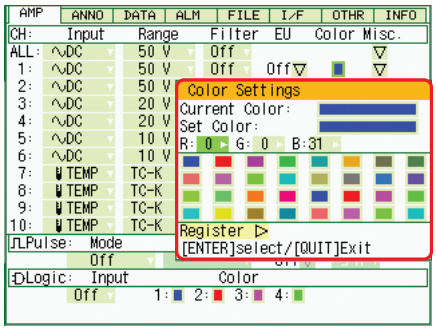
To specify a unit that is not displayed here, specify a user-defined character string as the Unit setting. Moreover, the setting specified here is displayed as the Unit setting.

Setting Example

	Upper Value	Lower Value
Specified Value	+2.5000	–2.5000
EU Value	+10.000	–10.000



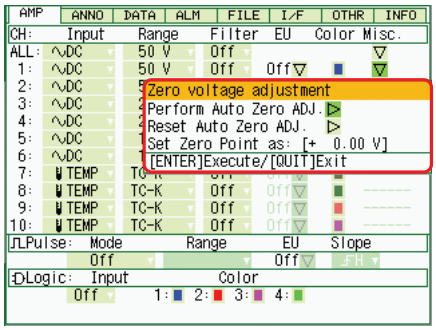
Color ..... This parameter enables the automatically set value for each channel to be changed manually.



Misc. ..... For voltage settings, zero position adjustment can be performed automatically, and the zero position reset.

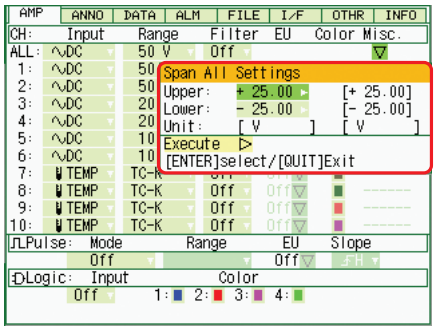
Perform Auto Zero ADJ.:
Moves the current 'pen' position to the origin point.

Reset Auto Zero ADJ.:
The zero position voltage value resets the displayed voltage value and adjusts the 'pen' to the origin point.



Misc. (ALL)..... When ALL has been selected, the Misc. menu contains a “Span All Settings” function that enables all the SPAN settings for the same group to be set simultaneously to the same values.

Upper, Lower:
Input the required values on the displayed setting screen.



Pulse ..... The signals that can be input to the pulse input terminal for data processing are Revol., Counts, and Inst.

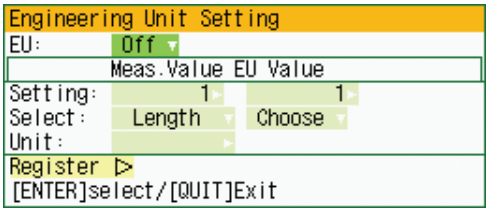
Modes: Select from OFF, Revol., Counts, and Inst.

- Off: Input is disabled.
- Revol.: Counts the number of pulses per second, and displays the values multiplied by 60 as rpm values.
- Counts: Displays the cumulative number of pulses for each sampling interval from the start of measurement.
- Inst.: Displays the number of pulses for each sampling interval.

Range: Can be set for each of the modes.

Mode	Range	Maximum number of pulse inputs
Revol.	500, 5k, 50k, 500k Revol./F.S.	50k/s
Counts	50k, 500k, 5M, 50M, 500M C/F.S.	50k/sampling interval
Inst.	50k, 500k, 5M, 50M C/F.S.	50k/sampling interval

EU: Scales and converts the measured value.



- Meas. Value: Specifies the numeric value to be converted.
- EU Value: Specifies output after conversion.
- Unit: Selects the converted unit, which can be specified as a user-defined character string consisting of alphanumerics. The Unit parameter can also be specified by selecting the Select Unit setting.
- Select: Selects the type of engineering unit.
- Choose: Selects the converted unit. The Unit displayed here is the type of unit selected by the Select Unit setting.

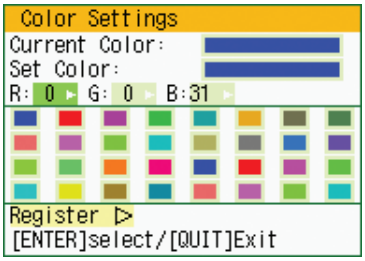
Slope: Sets the condition for the input signal operation.

- H: Operates when the signal is a rising signal
- L: Operates when the signal is a falling signal.

Logic ..... Enables logic amps to be used: Off (disabled), On (enabled).

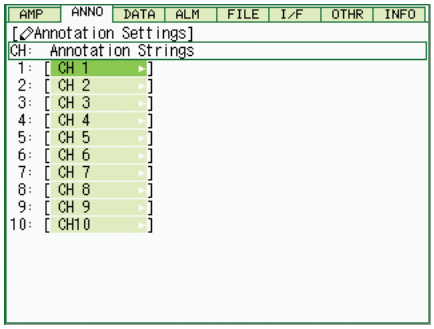
Color specification for each channel:

This parameter enables the automatically set value for each channel to be changed manually.



② ANNO Settings Window

Annotation settings can be made for each channel.



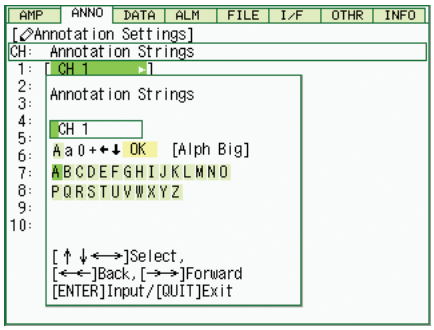
ANNO Menu Structure

Setting	Selections available	Setting method
Annotation character string	Alphanumerics, symbols	ENTER→Select→OK

Input procedure

- Up to 11 characters can be input for each channel.
- Text, numerals, and symbols can all be used.
- Display legend

A : Select to input upper-case text
a : Select to input Lower-case text
0 : Select to input Numerals
+ : Select to input symbols
← : Select to move the cursor to the left to delete text. The selected character is deleted.
↓ : Select to move the cursor to the position where you want to input text. Text is input at the selected character.
OK : Select to save the input text.

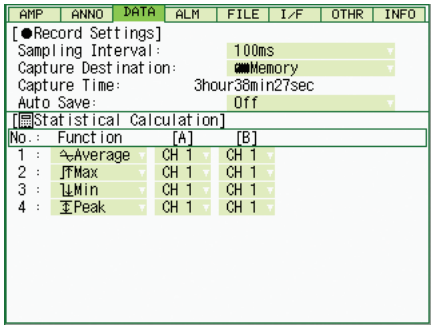


⚠CAUTION

If [* *] displayed on the screen, this indicates that text from the OPS022 software has been input in a format that cannot be displayed on the GL450 monitor.

③ DATA Settings Window

Data capture, Data replay, and Statistical Calculation settings are made here.



DATA Menu Structure

Setting	Selections available	Setting method
Record Settings • Sampling Interval	100, 200, 500ms 1, 2, 5, 10, 20, 30s 1, 2, 5, 10, 20, 30min, 1h	ENTER→Select→ENTER
Capture Destination	Memory, PC Card	ENTER→Select→ENTER
File Name	Specify file (only when PC card has been selected) • File Type: GBD, CSV	ENTER→Select→ENTER
	• Name Type: Auto, User	ENTER→Select→ENTER
	• File: Folder name, file name	ENTER→Specify file→OK
Auto Save	Off, I hour, 3 hours, 6 hours, 12 hours, 24 hours (only when internal memory has been selected)	ENTER→Select→ENTER
Statistical Calculation • Function	Off, Average, Max, Min, Peak, RMS	ENTER→Select→ENTER
Calculation channel specification	Select the number of channels from the input terminal unit: 2 ch	ENTER→Select→ENTER

Record Settings

Detailed settings for data capture are performed in this section.

Sampling Interval ..... Specifies the sampling interval for data capture. 16 intervals are provided.

CHECKPOINT

The maximum sampling interval that can be selected depends on the number of channels.

- 10ch: 100 ms
- 20ch: 200 ms
- 30/40/50 ch: 500ms
- 60ch or more: 1 sec

Capture Destination ..... Selects the destination for saving measured data.

Memory: 4 Mbytes (2 Mwords)
This is the total amount of memory. If the number of channels used is increased, the amount of data that can be captured is reduced.

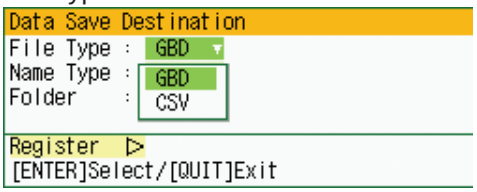
PC Card: Commercially-available PCMCIA cards can be used in the PC slot. The amount of data that can be saved to the card is determined by the card itself. (Please see Specifications for the types of card that can be used.)

CHECKPOINT

When the captured data is Binary data, the reference to use is 1 data = 2 bytes. Accordingly, if the memory is 12 bytes, approximately 6 Mwords of data can be captured. However, since there is also some auxiliary data, data larger than this reference figure will be captured. In addition, when the Excel data format is used, the data will increase to 7-8 times in size. The data capture time will be shorter than that for Binary data.

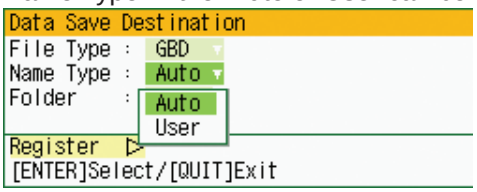
File Name ..... This parameter is displayed when PC card is selected as the capture destination.

File Type: This sets the file format for the data to be saved.



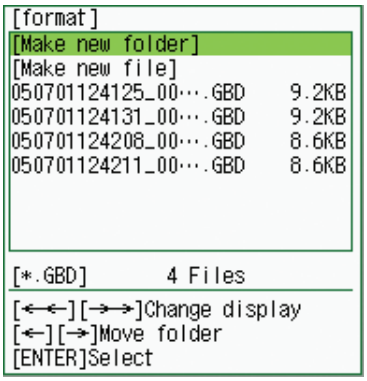
- GBD: Binary format
- CSV: Excel format

Name Type: Either Auto or User can be selected.



Folder: The currently selected folder is displayed. Settings cannot be made here.

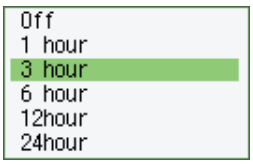
File name (User): A new folder and a new file are created here.



Capture Time ..... The time is automatically calculated, based on the sampling interval and the data capture volume, and displayed. This item is displayed only, and cannot be specified.

Auto Save ..... When this parameter has been selected, a file is created for each data capture time.

Off, 1, 3, 6, 12, 24 hours



The maximum data capture time that can be selected depends on the sampling interval.

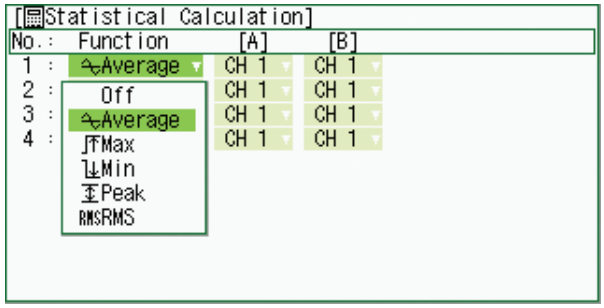
- 24 hours: 1s or less sampling interval
- 12 hours: 500 ms or less sampling interval
- 6 hours: 200 ms or less sampling interval
- 3 hours: 100 ms or less sampling interval

If the allowable data capture time is exceeded, the actual data capture time will be shortened.

Statistical Calculation

Statistical calculation is performed on the replay data between the cursors.

Function ..... There are five types of between-cursor calculation functions, and four of these can be selected.



Off: Calculation is not performed.

Average: The simple average value of the data between the cursors is displayed.

Max: The maximum value of the data between the cursors is displayed.

Min: The minimum value of the data between the cursors is displayed.

Peak: The peak value of the data between the cursors is displayed.

RMS: The effective value of the data between the cursors is displayed.

$$R.M.S = \sqrt{\Sigma D^2/n}$$

D: data *n: number of data*

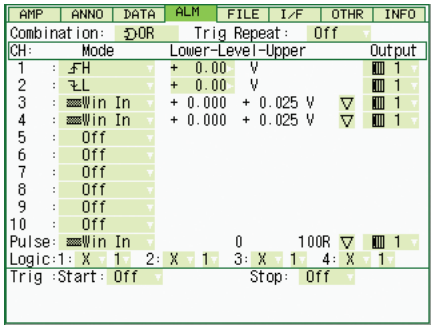
Channel specification: Specifies the two channels "A" and "B" for calculation.

CHECKPOINT

Calculation results during data capture are displayed on the Calculation Display screen.

④ ALM Settings Window

The Alarm and Trigger settings are made here.


AMP ANNO DATA ALM FILE I/F OTHR INFO
Combination: OR
Trig Repeat: Off
CH: Mode Lower-Level-Upper Output
1 : H + 0.00 V 1
2 : L + 0.00 V 1
3 : Win In + 0.000 + 0.025 V 1
4 : Win In + 0.000 + 0.025 V 1
5 : Off
6 : Off
7 : Off
8 : Off
9 : Off
10 : Off
Pulse: Win In 0 100R 1
Logic:1: X 1 2: X 1 3: X 1 4: X 1
Trig :Start: Off Stop: Off

Setting	Selections available	Setting method
Combination	OR, AND	ENTER→Select→ENTER
Repeat Trigger	On, Off	ENTER→Select→ENTER
Mode	H, L, Win In, Win Out	ENTER→Select→ENTER
Lower - Level - Upper	Numeric settings	ENTER→Select→ENTER
Output	1 to 4	ENTER→Select→ENTER
Pulse		
• Mode	L, H, Win In, Win Out	ENTER→Select→ENTER
• Lower - Level - Upper	Numeric settings	ENTER→Select→ENTER
• Output	1 to 4	ENTER→Select→ENTER
Logic		
• Mode	X, L, H	ENTER→Select→ENTER
• Output	1 to 4	ENTER→Select→ENTER
Trigger		
• Start	Off, Level, Alarm, Ext., Specified Time	ENTER→Select→ENTER
	Alarm output selection: 1 to 4	ENTER→Select→ENTER
• Stop	Off, Level, Alarm, Ext., Time, Specified Time	ENTER→Select→ENTER
	Alarm output selection: 1 to 4	ENTER→Select→ENTER
	Time setting: 1 s to 9999 h	ENTER→Select→ENTER

Combination

Determines the alarm output conditions. The logic alarm cable (B-513, option) is required for alarm output.

OR: Outputs an alarm when each alarm condition is met.
AND: Outputs an alarm when all of the alarm conditions are met.

Repeat Trigger

Used to specify repeated measurement. Measurement is performed repeatedly according to the Trigger Start and Stop conditions until the START/STOP key is pressed.

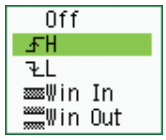
On: Repeated measurement
Off: Single measurement operation

CHECKPOINT

If repeated measurement has been specified and Memory selected as the capture destination, data captured to the GL450's internal memory is overwritten.

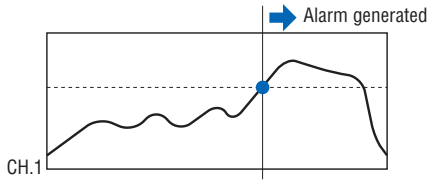
Condition settings

Mode ..... Determines the alarm output condition

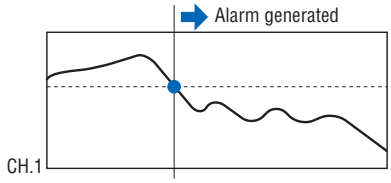


Off: The alarm function is disabled.

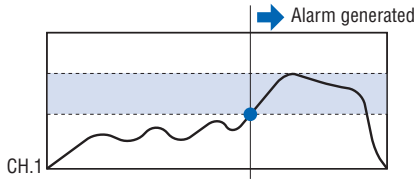
Rising: An alarm is generated when the signal input rises to (or exceeds) the specified alarm level.



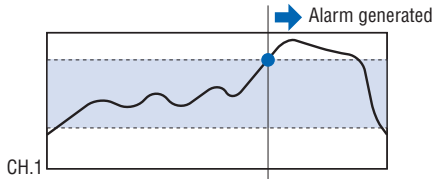
Falling: An alarm is generated when the signal input falls to (or falls below) the specified alarm level.



Win In: Specifies the upper and lower alarm limits for each channel. When the signal level goes within (or is within) both limits, an alarm is generated.

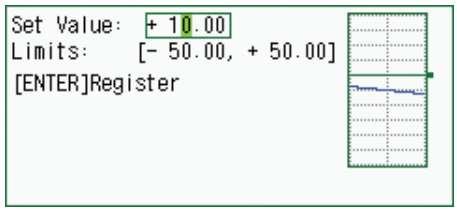


Win Out: Specifies the upper and lower alarm limits for each channel. When the signal level goes outside (or is outside) both limits, an alarm is generated.

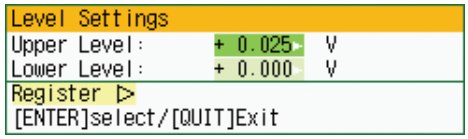


Lower - Level- Upper ..... Specifies the alarm level(s) for the conditions set in Mode.

Rising, Falling: Input a numeric value.



Win In, Win Out: Input numeric values for the upper and lower levels.



Output ..... Specifies the output channels for alarm generation (4 channels).

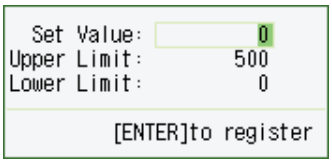
Pulse

Sets the alarms for pulse input settings. These conditions can be set when they have been enabled in the AMP settings.

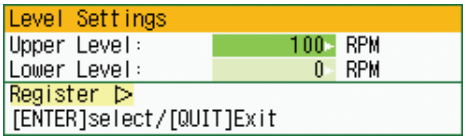
Mode ..... Sets the same conditions as for "Condition Settings". Please refer to "Condition Settings" in the previous section.

Lower - Level- Upper ..... Specifies the alarm level(s) for the conditions set in Mode.

Rising, Falling: Input a numeric value



Win In, Win Out: Input numeric values for the upper and lower levels.



Output ..... Specifies the output channels for alarm generation (4 channels).

Logic

Sets the alarms for logic input settings. These conditions can be set when they have been enabled in the AMP settings.

Mode ..... Sets the logic alarm conditions.

X: No alarm conditions set.

L: Enabled when the logic signal goes from High to Low.

H: Enabled when the logic signal goes from Low to High.

Trigger Settings

Start ..... Specifies the trigger condition that must be met in order to initiate measurement.

Off: No trigger is used. Instead, measurement is initiated by pressing the START/STOP key.

Level: The start of measurement is triggered when the trigger condition is satisfied.

Note: The Level condition is the level value set for the specified channel range set (voltage, temperature).

Alarm: The start of measurement is triggered when the alarm condition is satisfied.

Ext.: The start of measurement is triggered when a signal is input from an external trigger terminal.

Specified Time:
Measurement starts at the specified time or when the time trigger condition is satisfied.

If Repeat Trigger has been specified, the trigger action is as follows:

Triggered at: Off Absolute Time/On Relative Time

Stop ..... Specifies the trigger condition that must be met in order to stop measurement.

Off: No trigger is used. Instead, measurement is stopped by pressing the START/STOP key.

Level: Measurement is stopped when the trigger condition is satisfied.

Note: The Level condition is the level value set for the specified channel range set (voltage, temperature).

Alarm: Measurement is stopped when the alarm condition is satisfied.

Ext.: Measurement is stopped when a signal is input from an external trigger terminal.

Time: Sets the amount of time from the start until the end of measurement. The time can be specified from 1 second to 9999 hours.

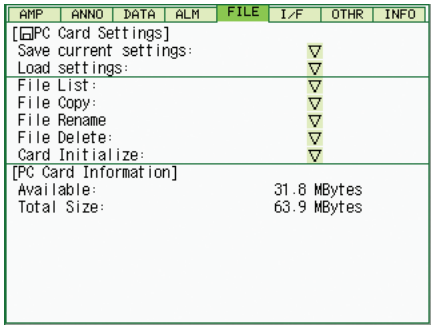
Specified Time:
Measurement is stopped (data capture ends) at the specified time or when the time trigger condition is satisfied.

If Repeat Trigger has been specified, the trigger action is as follows:

Triggered at: Off Absolute Time/On Relative Time

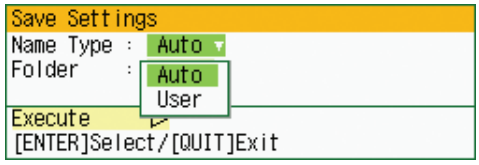
⑤ FILE Settings Window

Saves or loads the PCMCIA card settings or returns them to their factory default settings.



Setting	Selections available	Setting method
Save current settings	Auto, User	ENTER→Select→ENTER
	File name (when User) • File: Folder name, File name	ENTER→Select→EXECUTE
Load settings	Select file	ENTER→Select→EXECUTE
File List	Select file	ENTER→Select→EXECUTE
File Copy	Select file to load	ENTER→Select→EXECUTE
	Select file to write	
File Rename	Select file to convert	ENTER→Select→EXECUTE
	Converted file name	ENTER→Specify file→OK
File Delete	Select file	ENTER→Select→EXECUTE
Card Initialize	Format: Super Floppy, HDD format	ENTER→Select→ENTER
	Type: Quick, Normal	ENTER→Select→ENTER
	Volume Label: Specify a volume label	ENTER→Specify file→EXECUTE

Save current settings ..... Saves the currently selected settings. When this setting is selected, a submenu appears for selecting the save destination and file name.



Auto: A file name is created using the date and time.

User: The user-specified file name is saved.

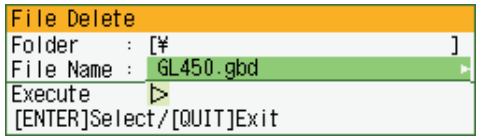
Load settings ..... Loads settings from the PCMCIA card. When this setting is selected, a submenu appears for specifying the source and file name.

File List ..... Displays a list of the files. When this setting is selected, a submenu appears for browsing the folders and specifying files.

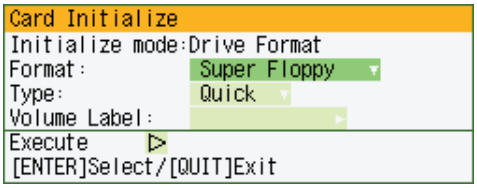
File Copy..... Copies the specified file. When this setting is selected, a submenu appears for specifying the source file and the destination file.

File Rename ..... Renames the specified file. When this setting is selected, a submenu appears for selecting the file you wish to rename and its new file name.

File Delete..... Deletes the specified file. When this setting is selected, a submenu appears for selecting the name of the file to be deleted.



Card Initialize ..... Reformats the PCMCIA card.



Format: Select from Super Floppy and HDD-compatible format.

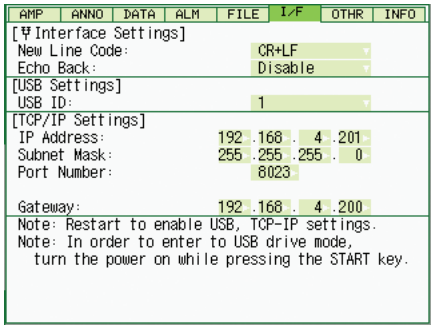
Type: Select Quick Format or Normal Format.

Volume Label: This parameter specifies the volume label of the card to be reformatted. Specify a volume label of up to 11 characters.

PC Card Info ..... Displays the volume of data on the PC card. No settings can be made here.

⑥ I/F Settings Window

The conditions for connecting to your computer are set here.



Setting	Selections available	Setting method
New Line Code	CR+LF, LF, CR	ENTER→Select→ENTER
Echo Back	Enable, Disable	ENTER→Select→ENTER
USB ID	0 to 7	ENTER→Select→ENTER
IP Address	Numeric setting	ENTER→Select→ENTER
Subnet Mask	Numeric setting	ENTER→Select→ENTER
Port Number	Numeric setting	ENTER→Select→ENTER
Gateway	Numeric setting	ENTER→Select→ENTER

New Line Code ..... Sets the new line code. Select from CR+LF, LF, or CR.
Echo Back..... This function can be specified as Enable or Disable.
USB ID Setting..... Sets the ID number for the GL450. Specify a number from 0 to 7.
TCP-IP Settings ..... Sets the TCP-IP.
IP Address: Sets the IP address.
Subnet Mask: Sets the subnet mask.
Port Number: Sets the port number.
Gateway: Sets a gateway for the network connection.

CHECKPOINT

Be sure to restart the GL450 after settings have been made or changed. If the GL450 is used as is, the computer connections may not be performed correctly.

USB PC Card Drive Mode

Inserting a PC card in the GL450's card slot and then connecting the GL450 to your computer via USB enables the GL450 to be used as an external PC card drive.

(1) Insert the PC card in the GL450's card slot.

(2) Use the USB cable to connect the GL450 to your computer.

(3) Turn on the GL450's power supply while holding down the [START] key.

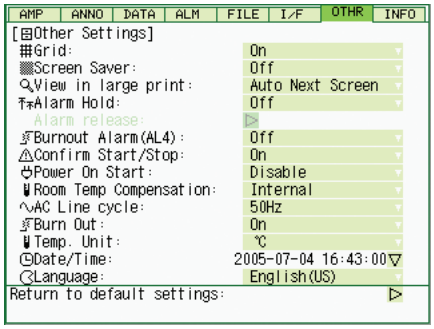
(4) A Removable Disk icon is displayed in your computer's "My Computer" window.

**** This operation is recommended only for those computers running Windows 2000 or Windows XP.***

**** The PC card cannot be replaced when the GL450 is being used as a removable disk.***

⑦ OTHR Settings Window

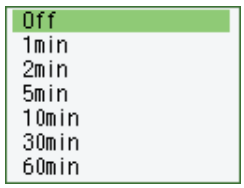
Other miscellaneous settings are made here.



Setting	Selections available	Setting method
Grid	Off, On	ENTER→Select→ENTER
Screen Saver	Off, 1, 2, 5, 10, 30, 60 min	ENTER→Select→ENTER
View in large print	Auto Next Screen, Fixed	ENTER→Select→ENTER
Alarm Hold	Off, On	ENTER→Select→ENTER
Alarm Cancel	–	ENTER
Output Alarm at Burnout (AL4)	Off, On	ENTER→Select→ENTER
Start/Stop Confirmation Message	Off, On	ENTER→Select→ENTER
Power On Start	Enable, Disable	ENTER→Select→ENTER
Room Temp. Compensation	Internal, External	ENTER→Select→ENTER
AC Line Frequency (External Filter)	50/60Hz (Off, On)	ENTER→Select→ENTER
Burn Out	Off, On	ENTER→Select→ENTER
Temp. Unit	°C, °F	ENTER→Select→ENTER
Date/Time	Date, time settings	ENTER→Select→Confirm
Language	Japanese, English (US), English (UK)	ENTER→Select→ENTER
Return to default settings	Yes, No	ENTER→Select→ENTER

Grid ..... The Grid parameter for display can be specified as either On or Off.
On: The waveforms are displayed on a grid.
Off. Only the waveforms (without any grid) are displayed.

Screen Saver ..... Turns off the display if the GL450 is not operated within the specified interval, thus prolonging the product life of the display.



Off: The screen saver does not operate.
Time: The interval can be specified as 1, 2, 5, 10, 30, or 60 minutes.

View in large print ..... This sets whether or not to switch automatically to the next group of digital display channels.
Auto Next Screen: The display changes automatically to the next group of channels.
Fixed: The display can only be changed manually.

Output Alarm at Burnout ..... If a burnout occurs during temperature measurement, an alarm is generated at alarm port number 4.

Alarm Hold ..... This parameter specifies whether or not to maintain the alarm status. If the Alarm Hold function is enabled, the alarm status is maintained until Alarm Cancel is selected.

Alarm Cancel ..... When On has been selected for the Alarm Hold parameter, select Alarm Cancel to cancel the alarm status when data capture has stopped. To cancel the alarm status during a data capture operation, press the MENU key and then the ENTER key.

Start/Stop Confirmation Message
..... If On has been selected for this parameter, a confirmation message box is displayed at the start of data capture. Select On to prevent any misoperation during data capture.

Power On Start ..... Initiates measurement as soon as the GL450 is turned on.

Disable: Disables the Power On Start function.

Enable: Enables the Power On Start function.

Room Temp. Compensation
..... This parameter enables room temperature compensation settings when thermocouples are used. You can select from either Internal or External room temperature compensation.

Internal: The GL450's room temperature compensation settings are used.

External: Select this parameter when measuring compensation other than that of the GL450.

Note: The Internal setting is normally used.

AC Line Frequency ..... Select the setting that matches the frequency of the AC line used. Use this parameter if there is AC line noise present when performing measurement.

50 Hz, 60 Hz

CHECKPOINT

With the 50 Hz and 60 Hz frequencies, the sampling speed at which AC line noise can be eliminated depends on the number of channels installed (please see the following table for details).

Sampling Speed/Number of Channels Correlation Table (When the Digital Filter is Enabled)

50/60: Can be eliminated at 50/60 Hz
100: Can be eliminated at 100 Hz or higher
NG: Cannot be eliminated
–: Cannot be selected

	Sampling speed					
	100 ms	200 ms	500 ms	1 s	2 s	5 s
10 CH	NG	100	50/60	50/60	50/60	50/60
20 CH	–	NG	100	50/60	50/60	50/60
30 CH	–	–	NG	100	50/60	50/60
40 CH	–	–	NG	100	50/60	50/60
50 CH	–	–	–	100	50/60	50/60
60 CH	–	–	–	NG	100	50/60
70 CH	–	–	–	NG	100	50/60
100 CH	–	–	–	NG	100	50/60

Burn Out ..... This parameter enables or disables the function that moves to full scale to inform of a sensor burnout in a thermocouple.

Off: The burnout function is disabled.

On: The burnout function is enabled.

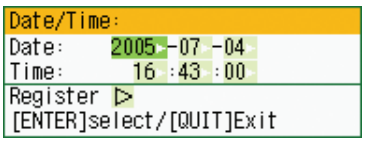
Note: We recommend that On be normally used.

Temp. Unit..... This parameter specifies the temperature unit.

°C: Celsius
°F: Fahrenheit

If °F is selected, the scaling function is compulsorily enabled.

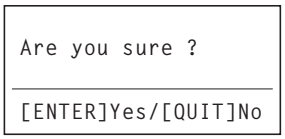
Date/Time ..... This parameter sets the date and time. When this setting is selected, a submenu appears for setting the date and time.



Language ..... This parameter sets the GL450's display language.

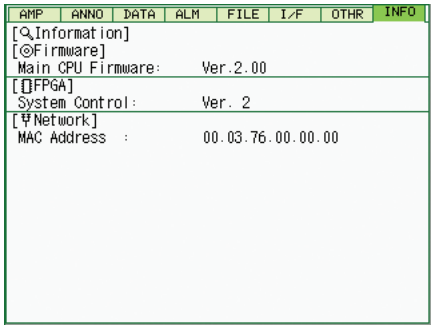
Japanese: The display is in Japanese.
English US: The display is in English.
English UK: The display is in English.
French: The display is in French.

Return to default settings .... This parameter returns all the settings to the factory defaults.



⑧ INFO Settings Window

The GL450's system settings are displayed here. Use this window to check the version and other information.



3.3 Data Replay

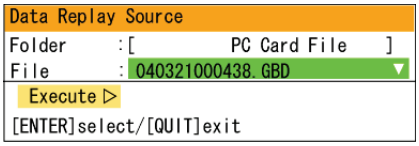
Data captured at the GL450 can be replayed on the monitor, and waveform search, statistical calculation, and data save functions performed.

Data replay selection screen

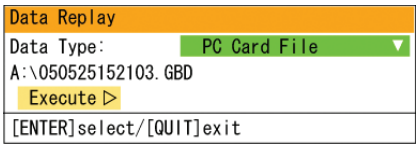
REVIEW key

- When a PC card is inserted in the card slot:
  The data replay menu is displayed.
  Select the data replay source of the captured data.

  Data Type ..... Select either the internal memory or the PC card as the replay source.
  Memory: Data captured to the internal memory is replayed.



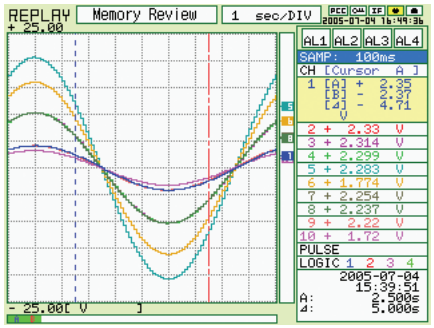
  PC card: Data captured to the PC card is replayed.



- When there is no PC card in the card slot:
  Data captured to the internal memory is displayed.

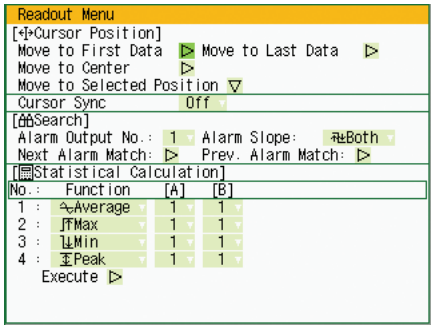
Data Replay

Press the REVIEW key to replay data.



Cursor display function ..... Press the CURSOR key to switch through the A, B selections.

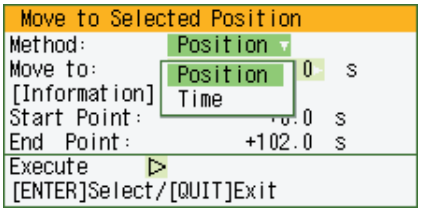
If the MENU key is pressed after a Replay operation, a menu for selecting the data processing operation is displayed.



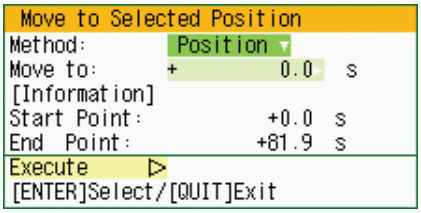
Setting	Selections available	Setting method
Cursor Position	Move to First Data	ENTER
	Move to Last Data	ENTER
	Move to Center	ENTER
	Move to Selected Position • Selected method: Position, Time	ENTER→Select→ENTER
	• Position Moved To (Position only) Between Upper and Lower Limit Values	ENTER→Specify numeric value →ENTER
	(Time only) Specified time	ENTER→Specify numeric value →ENTER
	• Execute	ENTER
Cursor Sync	Off, On	ENTER→Select→ENTER
Search	Alarm Output No.: 1 to 4	ENTER→Select→ENTER
	Alarm Slope: Both, Hi, Lo	ENTER→Select→ENTER
	Next Alarm Match	ENTER
	Prev. Alarm Match	ENTER
Statistical Calculation	Function: Off, Average, Max, Min, Peak, RMS	ENTER→Select→ENTER
	Specification Channels Select channels from the input terminal unit: 2 ch	ENTER→Select→ENTER

Cursor Position ..... There are other functions for Cursor Move apart from the Alarm Search function.

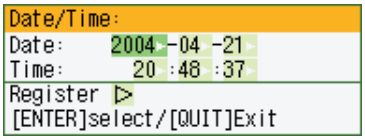
Move to First Data: Moves the cursor to the start of the data.
Move to Last Data: Moves the cursor to the end of the data.
Move to Center: Moves the cursor to the center of the data.
Move to Selected Position: Specify the cursor position to be moved to.



•Position:
Move at the specified time from the start of measurement. Interval until the end of measurement, in 0.1-s units



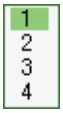
• Time: Move to the specified date/time.



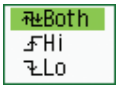
Cursor Sync ..... Moves cursors A and B simultaneously. Cursor A is always the fulcrum.

Search ..... This function searches for the alarm setting position within the captured data.

Alarm Output No.: Specify a number that has been set for the alarm settings (1 to 4).



Alarm Slope: Specify the generation condition for the alarm search.

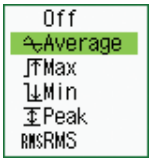


- Both: Both rising and falling
- Hi: Rising only
- Lo: Falling only

Next Alarm Match/Prev. Alarm Match:
Depending on whether Next or Prev. has been selected, matching data from the current cursor position to the next alarm position, or from the previous alarm position to the current cursor position is searched for and displayed.

Statistical Calculation..... Statistical calculation is performed on the replay data between the cursors.

Function: There are five types of between-cursor calculation functions, and four of these can be selected.

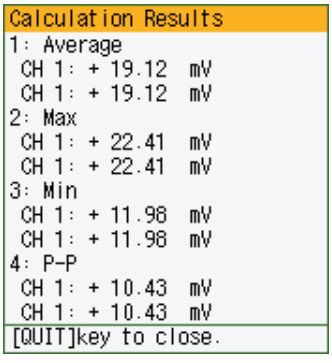


- Off: Calculation is not performed.
- Average: The simple average value of the data between the cursors is displayed.
- Max: The maximum value of the data between the cursors is displayed.
- Min: The minimum value of the data between the cursors is displayed.
- Peak: The peak value of the data between the cursors is displayed.
- RMS: The effective value of the data between the cursors is displayed.

$$R.M.S = \sqrt{\Sigma D^2/n}$$

D: data N: number of data

Channel specification:
Specifies the two channels "A" and "B" for calculation. Press EXECUTE to display the between-cursor calculation results.



CHAPTER 4
Software

This chapter describes the software installation.

4.1 System Requirements
4.2 Installing the USB Driver
4.3 Connecting to a PC
4.4 Installing OPS022
4.5 Setting the IP Address and Device ID
4.6 Menu Configuration and System Settings
4.7 PC Connection Settings
4.8 Measurement Parameters Settings
4.9 View Functions
4.10 Review Device
4.11 Review PC
4.12 Logic, Alarm Display

4.1 System Requirements

Make sure that the computer on which you plan to install the software meets the following requirements.

Item	System requirements
OS	Windows 2000, XP
CPU	Pentium 4, 1.7 GHz or higher
Memory	256 MB or more
HDD	10 MB for installing software, additional space required for data storage
Display	1024 x 768 resolution or higher, 65535 colors or more (16-bit or more)
Other	TCP-IP port, USB port, CD-ROM drive (for installing from CD)

CHECKPOINT

Even when using a PC that meets the system requirements, measurement data may not be captured correctly depending on the PC status (e.g. running other applications or the storage media used). Exit all other applications before capturing data to the hard disk.
For faster data transmission via the USB connection, use a USB 2.0-capable computer.

4.2 Installing the USB Driver

This section describes how to install the USB driver.

Checking the version of your USB driver

This section describes how to view the version of the USB driver if it is already installed.

(1) Opening "Device Manager"
Select "Control Panel" → "System" → "Hardware" tab or right-click "My Computer", select "Properties" → "Hardware" tab → "System Properties" window, then click the "Device Manager".

(2) In the "Device Manager" window, open "USB (Universal Serial Bus) Controller". Confirm that "Graphtec DM/GL/WR Series USB Driver" is shown. Right-click it and select "Properties".

(3) Updating the driver
Select the "Driver" tab and click the "Driver Details" button.

(4) Select [....GTCUSBR.SYS] to view the version of the driver file.

Installing the USB Driver

This section describes how to install the USB driver.

(1) Insert the GL450 User Guide CD-ROM provided as a standard accessory into the PC CD-ROM drive.

(2) Connecting the GL450 to the PC.
Connect the GL450 to the PC using the USB cable, and then turn the power on.

(3) Install the USB driver. The installation procedure depends on the type of operating system and whether or not you are installing the driver for the first time.

Windows XP : Driver software is to be installed for the first time.
: Driver software is already installed.

Windows 2000 : Driver software is to be installed for the first time.
: Driver software is already installed.

Windows XP: Driver software is to be installed for the first time.

Installing the USB driver

(1) Detecting the hardware
Connect the USB cable to the PC and GL450. The "Found New Hardware" message appears.

(2) Starting the wizard
In the "Found New Hardware Wizard" window, select "Install from a list or specific location (Advanced)" under "What do you want the wizard to do?" and click "Next".

(3) In the "Please choose your search and installation options." window, select "Don't search. I will choose the driver to install." and click "Next".

(4) In the "Select the device driver you want to install for this hardware." window click "Have Disk".

(5) In the "Install from Disk" window, browse the CD-ROM under "Copy manufacturer's files from", select "USB DRIVER "GTCUSBR.INF" and click "OK".

(6) In the "Select the device driver...." window, "Graphtec DM/GL/WR Series USB Driver" appears in the "Model" box. Select it and click "Next".

(7) Installing the driver
Windows XP starts installing the driver.

(8) Completing installation
The "Completing the Found New Hardware Wizard" window appears. Click "Finish" to exit the wizard.

Windows XP: Driver software is already installed.

Updating the USB driver

(1) Opening "Device Manager"
Select "Control Panel" → "System"→ "Hardware" tab or right-click "My Computer", select "Properties" → "Hardware" tab → "System Properties" window, then click the "Device Manager" button.

(2) In the "Device Manager" window, open "USB (Universal Serial Bus) Controller". Confirm that "Graphtec DM/GL/WR Series USB Driver" is shown. Right-click it and select "Properties".

(3) Updating the driver
Select the "Driver" tab and click "Update Driver".

(4) Starting the update wizard
The "Hardware Update Wizard" appears. Select "Install from a list or specific location (Advanced)" under "What do you want the wizard to do?" and click "Next".

(5) In the "Please choose your search and installation options." window, select "Don't search. I will

choose the driver to install." and click "Next".

(6) In the "Select the device driver you want to install for this hardware." window, click "Have Disk".

(7) In the "Locate File" window, browse the CD-ROM, select "USB DRIVER" "GTCUSBR.INF" and click "Open".

(8) Return to the "Select the device driver..." window and click "Next".

(9) Installing the driver
Windows XP starts installing the driver. Depending on the OS setting, "The software you are installing for this hardware has not passed Windows Logo Testing to verify its compatibility with Windows XP" message may appear. Simply click "Continue Anyway".

(10) Completing the Installation
The "Completing the Hardware Update Wizard" window appears. Click "Finish" to exit the wizard.

Windows 2000: Driver software is to be installed for the first time.

Installing the USB driver

(1) Starting the wizard
Connect the USB cable to the PC and the GL450. The "Found New Hardware" wizard appears.

(2) In the "Found New Hardware Wizard" window, select "Search for a suitable driver for my device (Recommended)" under "What do you want the wizard to do?" and click "Next".

(3) In the "Locate Driver File" window, select "CD-ROM drive" under "Optional search locations" and click "Next".

(4) Browse the CD-ROM, select "USB DRIVER "GTCUSBR.INF" and click "OK".

(5) "The wizard found a driver" message appears. Click "Next".

(6) Completing installation
The "Completing Found New Hardware Wizard" window appears. Click "Finish" to exit the wizard.

Windows 2000: Driver software is already installed.

Updating the USB driver

(1) Opening "Device Manager"
Select "Control Panel" → "System" → "Hardware" tab or right-click "My Computer", select "Properties" → "Hardware" tab → "System Properties" window, then click the "Device Manager" button.

(2) In the "Device Manager" window, open "USB (Universal Serial Bus) Controller". Confirm that "Graphtec DM/GL/WR Series USB Driver" is shown. Right-click it and select "Properties".

(3) Updating the driver
Select the "Driver" tab and click "Update Driver".

(4) Starting the update wizard
"Upgrade Device Driver Wizard" appears. Click "Next".

(5) In the "Install Hardware Device Drivers" window, select "Display a list of the known drivers for this device so that I can choose a specific driver." under "What do you want the wizard to do?" and click "Next".

(6) In the "Select a Device Driver" window, click "Have Disk".

(7) In the "Locate File" window, browse the CD-ROM, select "USB DRIVER "GTCUSBR.INF" and click "OK".

(8) Return to the "Select a Device Driver" window and click "Next".

(9) In the "Start Device Driver Installation " window, click "Next".

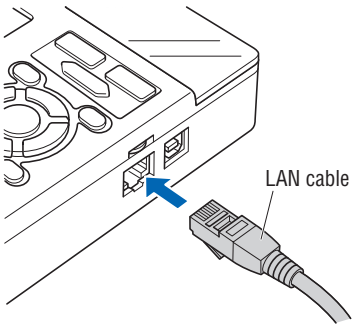
(10) Completing installation
The "Completing the Upgrade Device Driver Wizard" window appears. Click "Finish" to exit the wizard.

4.3 Connecting to a PC

The GL450 can be connected to a PC via a LAN cable or a USB cable.

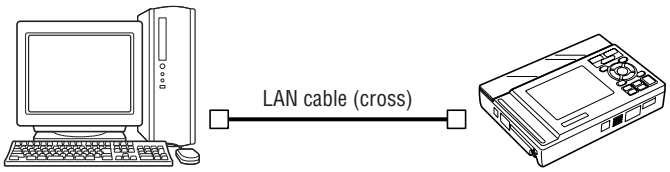
Connecting Using a LAN Cable

Use a LAN cable to connect the GL450 to a PC.

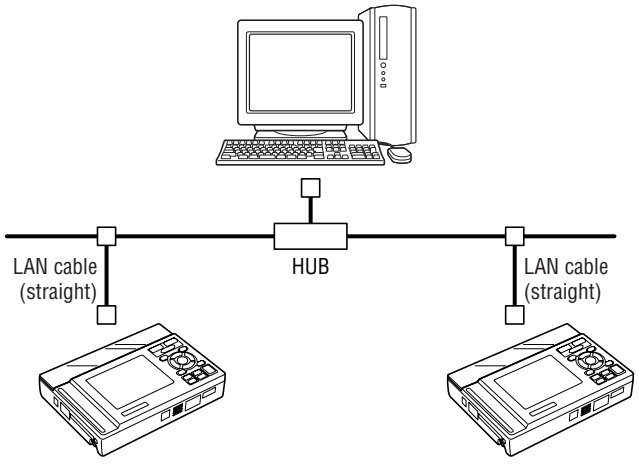


Connection Methods

When connecting the GL450 to a PC directly, use a cross cable.

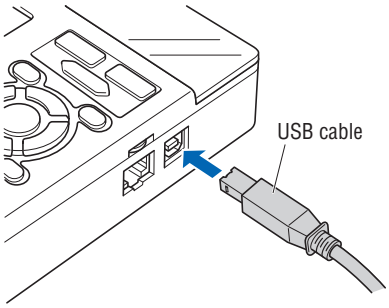


When connecting via a network, use a straight cable and connect through a hub.



Connecting Using a USB Cable

Use a USB cable to connect the GL450 to a PC.

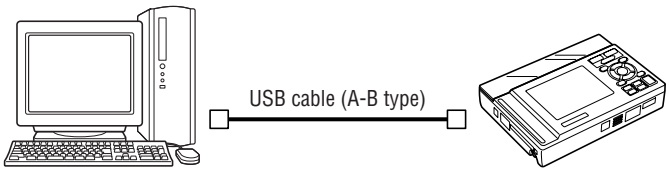


CHECKPOINT

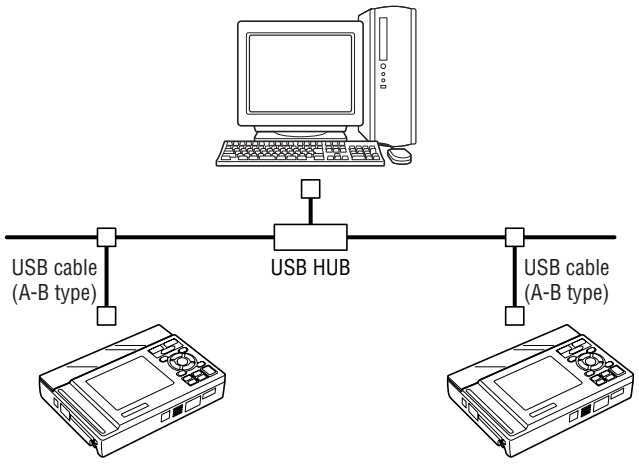
When using a USB cable, a USB driver must be installed in the PC. Please see Section 4.2 "Installing the USB Driver" for the installation procedure.

Connection Methods

When connecting the GL450 to a PC directly, connect using an A-B type cable.



When connecting via a network, use an A-B type cable and connect through a USB hub.



4.4 Installing OPS022

This section describes how to install the application software and the system setting tools used to control and set the GL450.

(1) Insert the GL450 User Guide CD-ROM provided into the PC CD-ROM drive.

(2) Click the Taskbar's Start button, then click the Run... icon to open the "Run" window.

(3) Enter the CD-ROM drive name and \English\OPS022\SETUP.EXE as the name of the file you wish to open. If the disk is in drive D, for example, enter "D\English\ OPS022\SETUP.EXE" in the box to launch the installer.

(4) Continue, following the instructions on the screen.

CHECKPOINT

Be sure to observe the following points when connecting the GL450 to a PC.

- Do not connect any devices apart from a mouse or a keyboard to any of the other USB terminals on your PC.
- Set the PC's power-saving functions to Off.
- Set the Screen Saver to Off.
- Set the anti-virus software auto update and scan scheduler functions to Off. Also, set the Windows auto update and scheduler functions to Off.

4.5 Setting the IP Address and Device ID

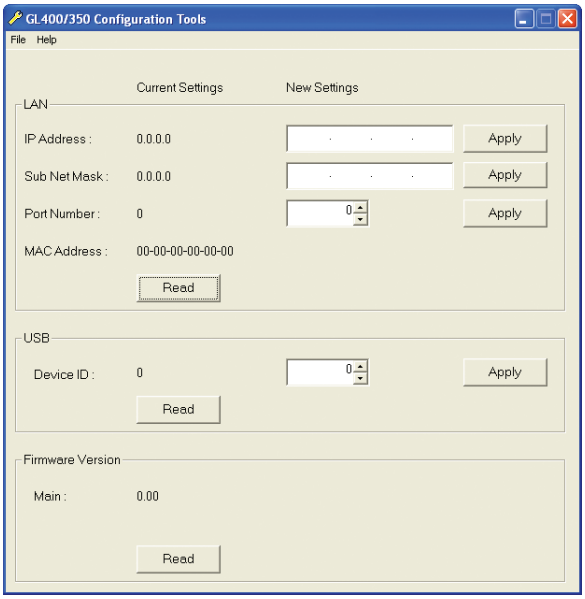
The GL450 Configuration Tools window is used to set the IP address, and Device ID. For details, see Chapter 3, "Settings and Measurement".

IP address: Used when measuring via a network.
Subnet Mask: Used when measuring via a network.
Mac Address: Used to confirm the Mac address.
Port Number: Used when measuring via a network.
Device ID: Used when measuring via USB.
Firmware Version: Used to check each version number.

CHECKPOINT

- When setting the IP address, port number, or device ID using the Configuration Tools, the GL450 should be connected directly to the PC using a USB cable.
- When using Configuration Tools, they should be connected separately, and not via a USB hub.
- When connecting via LAN, make the settings outlined below and then ensure that the computer's system requirements are met before making the connections.

(1) Connect the GL450 to the PC using a USB cable.
Select "Start" → "Programs" → "OPS022" → "GLCONFIG.EXE" to launch the GL450 Configuration Tools and display the window as shown below.



(2) LAN Settings
Click "Read" to display the current setting. To set a new IP Address, Subnet Mask and/or Port Number, enter the new settings and then click "Apply".

(3) USB Settings
Click "Read" to display the current setting. To set a new Device ID, enter the new Device ID number and then click "Apply".

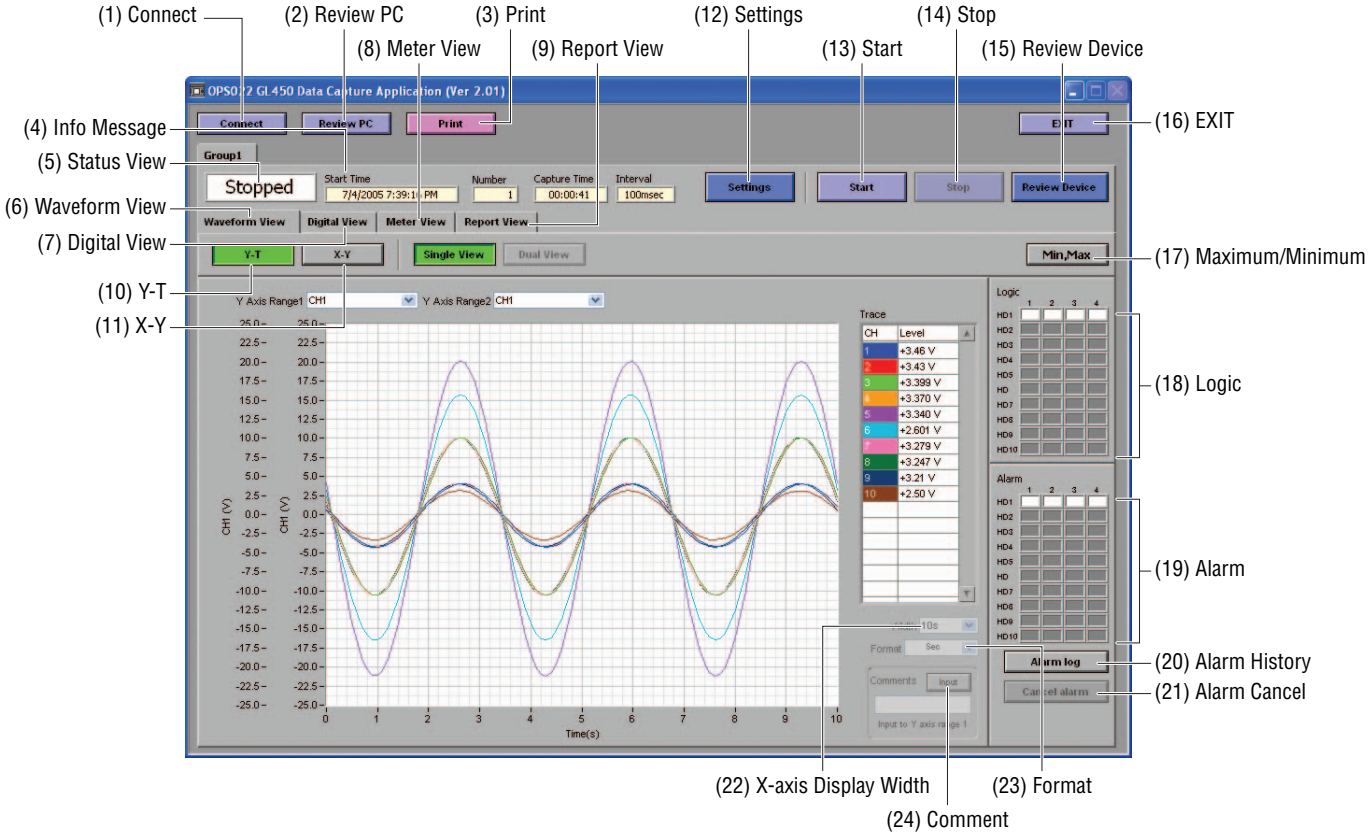
(4) Firmware Version
Click "Read" to display the Main version number. Use this function to check the version number of your equipment.

(5) After setting, exit from GL450 Configuration Tools.

4.6 Menu Configuration and System Settings

Starting the Software

Click "Start" "Programs" "OPS022" to launch OPS022. Once started, the following window is displayed.



Menu Configuration

Menu Name	Selections	
(1) Connect	Connection method	USB, TCP-IP
	Edit	No., Name IP Address, Port, USB ID
		Group: Setting groups 1 to 10
		Host: Master, Slave
		Status: OK/NG
	Delete, Connect, Disconnect, Load Conditions, Save Conditions	
(2) Review	Open File	
	Superimpose/Link	Select files to superimpose/link: Add, Delete
	Convert then Save	File Path: Format, Path
		Data: All Cursor
		Spot Samples: Off, Select from 2 to 1000 points
	Open in EXCEL	Data: All Cursor
		Spot Samples: Off, Select from 2 to 1000 points
	Print	
	XY Between Cursors	
	Calculation	
	Comment	Input, Delete
(3) Print		
(4) Info Message	Start Time, Capture Number, Capture Time, Capture Interval	
(5) Status View	Stopped, Armed, Recording, Finished	

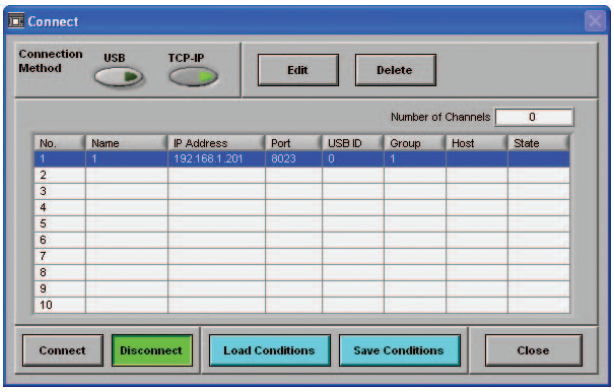
Menu Name	Selections	
(6) Waveform View	Single View, Dual View (during data capture only)	
(7) Digital View	1-20 to 81-100, 1-50, 51-100	
(8) Meter View	1-20 to 81-100	
(9) Report View	View in EXCEL	
(10) Y-T	Single View Display, Dual View Display, Y Axis Range 1, Y Axis Range 2, X-axis Display Width	
(11) X-Y		
(12) Settings	AMP	Select CH: From 1-10 to 91-100
		Analog AMP Settings: Line Color, Annotation, Input, Range, Filter, Unit
		All CH: Input, Range, Filter
		Logic/Pulse Settings, Device Number 1 to 10
		Logic: On, Off • Line Color: 1 to 4
		Pulse: Line Color, Input, Range, Slope
	X-Y	XY Graph Settings: Disp., Line Color, X Axis, Y Axis
	Span	Select CH: From 1-10 to 91-100
		CH Span Settings: Upper, Lower
	Scaling	Select CH: From 1-10 to 91-100 • Meas. Output: Func, Upper, Lower • Scaling Output: Upper, Lower, Unit
		Pulse Settings Device Number.: 1 to 10 • Meas. Output: Func, Upper, Value • Scaling Output: Upper, Unit
	Data	Device Settings: Sampling Interval, Data Capture Setting
		PC Card Settings: File Name, Format, File Path
		PC Settings: Capture File Setting, Auto File Name, Format, File Path
		Auto Backup Settings: Create Backup File, Backup Interval
	Alarm	Select CH :From 1-10 to 91-100
		Alarm Settings: Function, Upper, Lower, Alarm Output, Combination
		Alarm: Logic, Pulse Settings, Device Number: 1-10
		Logic: Function, Alarm Output
		Pulse: Function, Upper, Lower, Alarm Output
		Alarm Hold: Maintains the alarm status
	Trigger	Trigger Settings • Start: Function, Alarm Output, Date • Stop: Function, Alarm Output, Date, Time • Repeat Trigger
		Level Trigger Settings • Start: CH, Function, Upper, Lower • Stop: CH, Function, Upper, Lower
	File	PC Card Operation Data Transfer, Copy File, Delete File, Delete Folder
		Device Number: 1 to 10
		Card Initialize, Path, File
	Report	Daily Capture: Capture Interval, Destination Folder Monthly Capture: Capture Interval, Destination Folder
		Output Format: Save as CSV file, Export to Direct Excel File
		CSV File Settings • Daily Capture: Save Folder • Monthly Capture: Save Folder
		Export to Direct Excel File Settings • Template File: Template file • Daily Capture: Save Folder Export Sheet • Start Cell: Horizontal, Vertical • Monthly Capture: Save Folder Export Sheet • Start Cell: Horizontal, Vertical

Menu Name	Selections	
(12) Settings	Other	Device Number: 1-10
		• Room Temp. Compensation • Burn out • Output alarm when burn out (Alarm Number 4) • Temp Unit • AC Line Cycle • Power On Star • Store the setting conditions into GL450 • Synchronize PC and device clocks • Factory Default Setting
		Send E-Mail Send E-mail when alarm is generated, Mail Address, Comments, SMTP Server, Sender Mail Address
	Information	OPS022 Version, Device Information
(13) Start		
(14) Stop		
(15) Review Device	Open File	Device, Path, Create Folder, Delete, Open Memory Data File, Filter
	Superimpose/Link	Select files to superimpose/link: Add, Delete
	Convert then Save	File Path: Format, Path
		Data: All, Cursor
		Spot Samples: Off, Select from 2 to 1000 points
	Open in EXCEL	Data: All, Cursor
		Spot Samples: Off, Select from 2 to 1000 points
	Print	
	XY Between Cursors	
	Calculation	
	Comment	Input, Delete
(16) EXIT		
(17) Maximum/Minimum		
(18) Logic		
(19) Alarm		
(20) Alarm History		
(21) Alarm Cancel		
(22) X-axis Display Width		
(23) Format	Second, Relative Time, Absolute Time	
(24) Comment	Input	

4.7 PC Connection Settings

The GL450 can be connected to a computer via USB or TCP-IP (LAN).

(1) Click the "Connect" button on the main menu to display the Connect window.
Select USB or TCP-IP.



(2) Edit
Several settings need to be made to enable connection to your PC.

No.: Select a number from 1 to 10. When a number is selected, a submenu (settings list) appears.

Name: Be sure to enter a name (any name) for device control.

Note: Input of a name is essential

CHECKPOINT

The number specified here becomes the device number, and is displayed as such in the application.

IP Address: Set the IP address for the GL450 connected (when using the TCP-IP interface).

Port: Set the port number for the GL450 connected (when using the TCP-IP interface)

USB ID: Set the ID number for the GL450 connected (when using the USB interface)

Group: When two or more GL450 devices are being used for simultaneous measurement, register them in the same group. This setting must be made for simultaneous measurement.

When all the settings have been made, click the "OK" button to complete the setting operation.

(3) Connect, Disconnect/Load Conditions, Save Conditions

Connect: When the "Connect" button is clicked to connect the GL450 to the computer after the settings have been made, "OK" is displayed to indicate that the connection can be made. Clicking the "Close" button connects the GL450 to the computer.

CHECKPOINT

"NG" is displayed if the connection conditions are incorrect. Check the condition settings once again.

Disconnect: Click this button to cancel the connected status. If the GL450 is not connected and this button is clicked, the status display goes blank.

Load Conditions: Click this button to load previously-saved settings.

Save Conditions: Click this button to save the settings. Please specify the file name and save destination. The file name will have a .cfg extension.

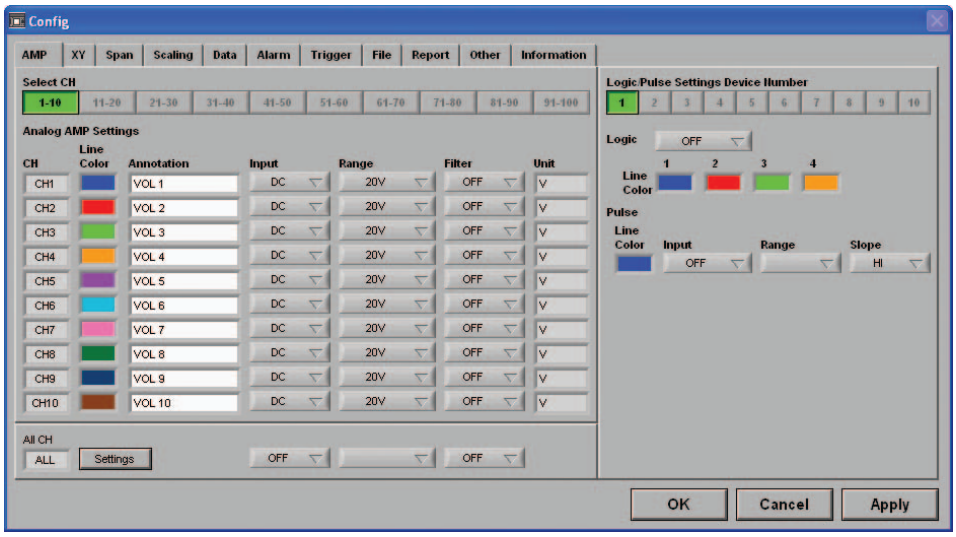
4.8 Measurement Parameters Settings

Click the "Settings" button on the main menu to enable device and measurement parameters for the GL450 to be made.

CHECKPOINT

The GL450 settings are changed whenever the "OK" or "Apply" button is clicked in each setting menu.

AMP Settings



(1) Select CH

Specify a group or groups of channels in the range [1 to 10] through [91 to 100].

Analog AMP Settings:

- Line Color: Specifies the color for each channel.
- Annotation: Up to 11 characters can be input for each channel.

CAUTION

Certain characters used here may not be displayable on the GL450 monitor.

- Input: OFF, DC, Temp, RH

  Sets the input type for each channel.

CHECKPOINT

For RH, the following settings are automatically made:
DC: 1V; Scaling: 0V → 0%, 1V → 100%

- Range

  DC: 20, 50, 100, 200, 500 mV, 1, 2, 5, 10, 20, 50 V

  CHECKPOINT

  For the 1-5V range, select 5V, and then specify 5V for the upper span limit and 1V for the lower span limit.

  Temp: Specify one of the following:

  TC-K, TC-J, TC-T, TC-E, TC-B, TC-R, TC-S, TC-N, TC-W, Pt100, JPt100.

- Filter: Off, On

  Select On if you need to cut noise.

• Unit: The measurement unit is displayed during measurement.

• All CH:
Sets the Input, Range, and Filter values to the same values for all the channels in the displayed group. Click the "Set" button next to "All CH" to make the settings.

(2) Logic/Pulse Settings

Device Number: Specify which of the connected devices to use for logic input.

Logic: Off, On
Select On if a Device Number was specified.

• Line Color: Specifies the colors for channels 1 to 4.

Pulse

• Line Color: Specifies the color.

• Input: OFF, Counts, Revolutions, Inst.
OFF: Pulses are not measured.

• Revolutions: Counts the number of pulses at 1-second intervals and then multiplies them by a factor of 60 to display them as revolutions.

• Counts: Displays the cumulative number of pulses for each sampling interval from the start of measurement.

• Inst.: Counts the number of pulses for each sampling interval.

Range: Can be set for each of the modes.

Mode	Range	Maximum number of pulse inputs
Revolutions	50k, 500k, 5M, 50M, 500M C/F.S.	50 k/sampling interval
Counts	500, 5k, 50k, 500k RPM/F.S.	50k/s
Inst.	50k, 500k, 5M, 50M C/F.S.	50 k/sampling interval

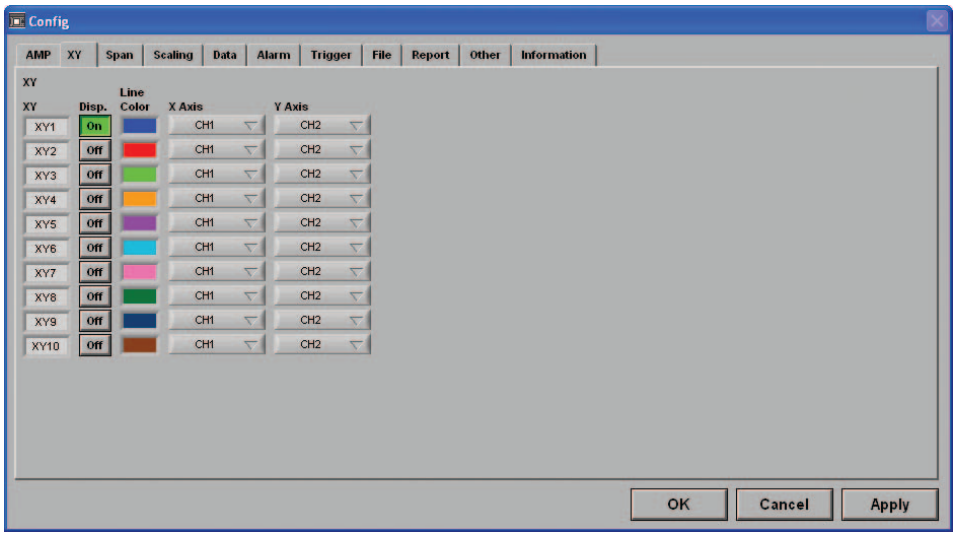
Slope: Sets the condition for the input signal operation.

• H: Operates when the signal is a rising signal

• L: Operates when the signal is a falling signal.

X-Y Settings

Specify a combination of the X channel with one of the Y channels to display measurement data in XY format. 10 combinations are provided.



Disp.: On (Enabled), Off (Disabled)
Select On for X-Y display of the selected combination.

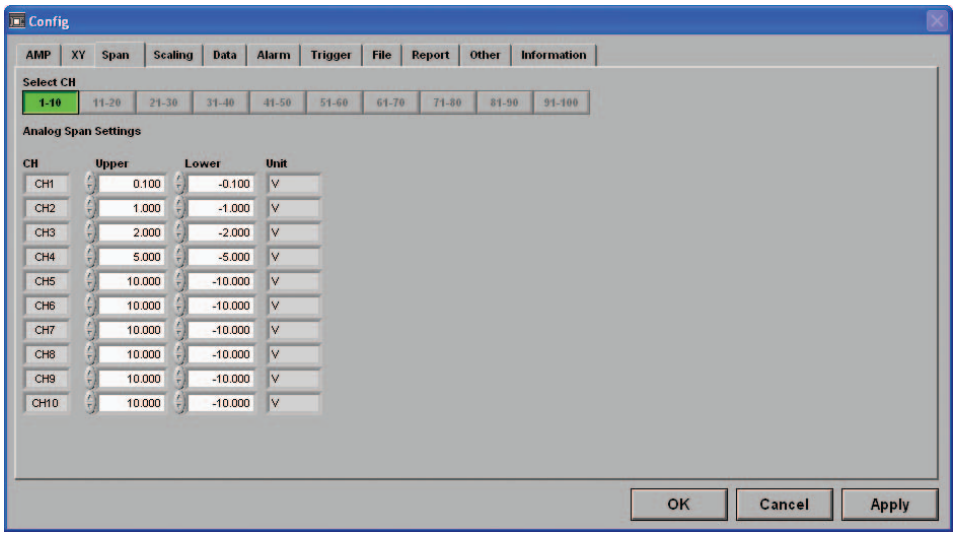
Line Color: Specify the colors

X Axis: Specify the channel for displaying X-axis measurement data.

Y Axis: Specify the channel for displaying Y-axis measurement data.

Span

Click the "Span" button on the main menu to enable Span settings to be made.



(1) Select CH

Specify a group or groups of channels in the range [1 to 10] through [91 to 100].

(2) Analog Span Settings

Upper: Specify the upper limit value of the set range.

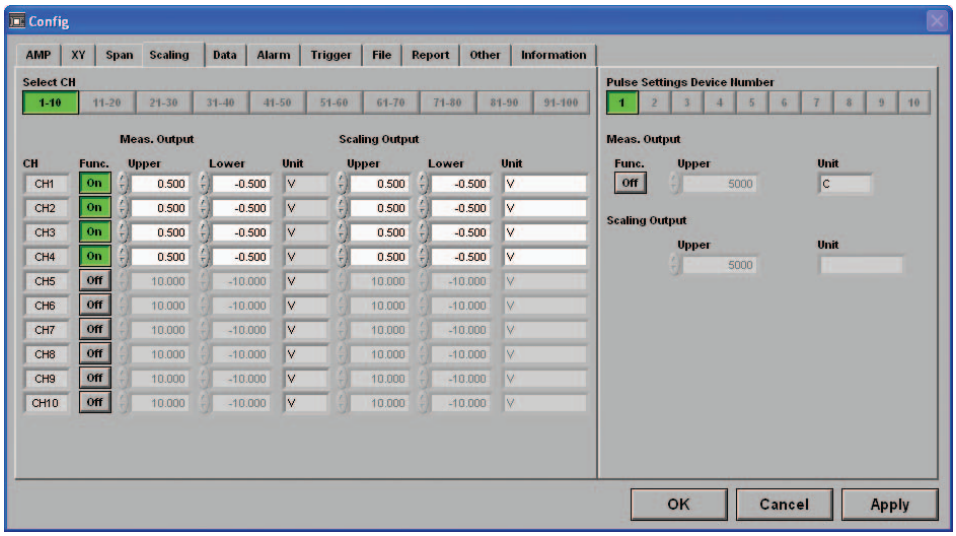
Lower: Specify the lower limit value of the set range.

CHECKPOINT

For the 1-5V range, select 5V for the Amp Settings range, and then specify 5V for the upper span limit and 1V for the lower span limit.

Scaling

Use the Scaling function to perform calculation functions on the measured values and the scaling values.



(1) Select CH

Specify a group or groups of channels in the range [1 to 10] through [91 to 100].

Meas. Output

- Function: Off, On
- Upper: Displays the Upper Limit Value of the set span.
- Lower: Displays the Lower Limit Value of the set span.
- Unit: Displays the unit for the set range. (Display only)

Scaling Output

- Sets the converted numerals and unit when the measured values are scaled.
- Upper: Sets the Upper Limit Value to be converted.
- Lower: Sets the Lower Limit Value to be converted.
- Unit: Input the unit for conversion.

(2) Pulse settings

Device number: Specify a Device Number from 1 to 10.

Function: Off, On

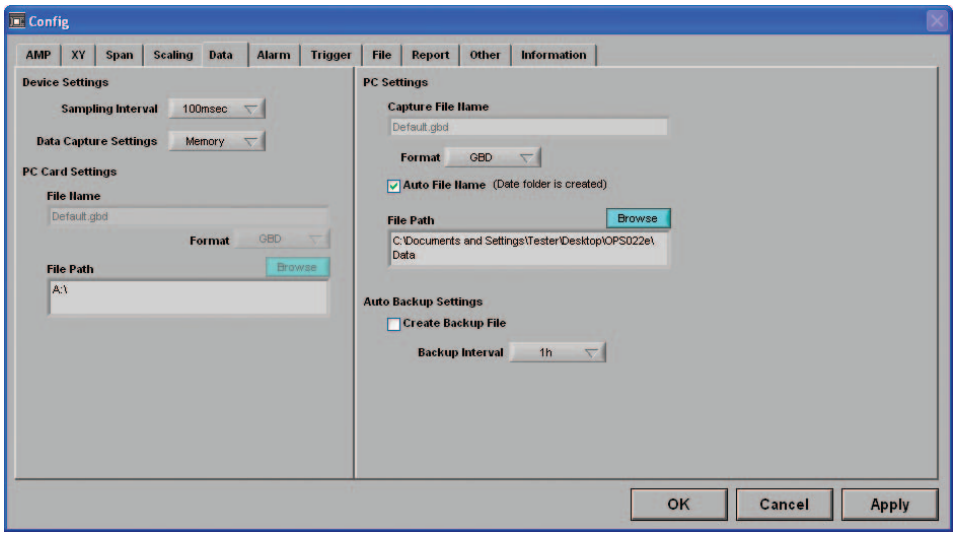
- Select On to enable scaling.
- Upper: Sets the Upper Limit Value.
- Unit: Sets the unit.

Scaling Output

- Upper: Sets the Upper Limit Value to be converted.
- Unit: Input the unit for conversion.

Data

Click the "Data" button to set measurement parameters, the data capture destination, etc.



(1) Device Settings

Sampling Interval: 100, 200, 500 ms, 1, 2, 5, 10, 20, 30 s, 1, 2, 5, 10, 20, 30 min, 1 h
Specifies the sampling speed for the GL450.

CHECKPOINT

The maximum sampling interval that can be set is limited by the number of channels installed.

Data Capture Setting: Internal memory, PC card

(2) PC Card Settings

File Name: Specifies the file name for data capture.

Format: GBD, CSV
Specifies the data format for saving measurement data

File Path: Specifies the file path when saving data to a PC card.

(3) PC Settings

Capture File Name: Specifies the file name when data is captured to the computer.

Format: GBD, CSV
Specifies tmhe data format for saving measurement data.

Auto File Name: Specifies a file name automatically. The date and time are appended to the file name.

CHECKPOINT

When the setting is Auto File Name, a folder labeled with the date on which data capture started is created, and the data is stored to that folder.

Example: If the date is June 1, 2005, the data is stored to
Specified folder \2005-06-01\

File Path: Specifies the file path when saving data to a computer.

(4) Auto Backup Settings

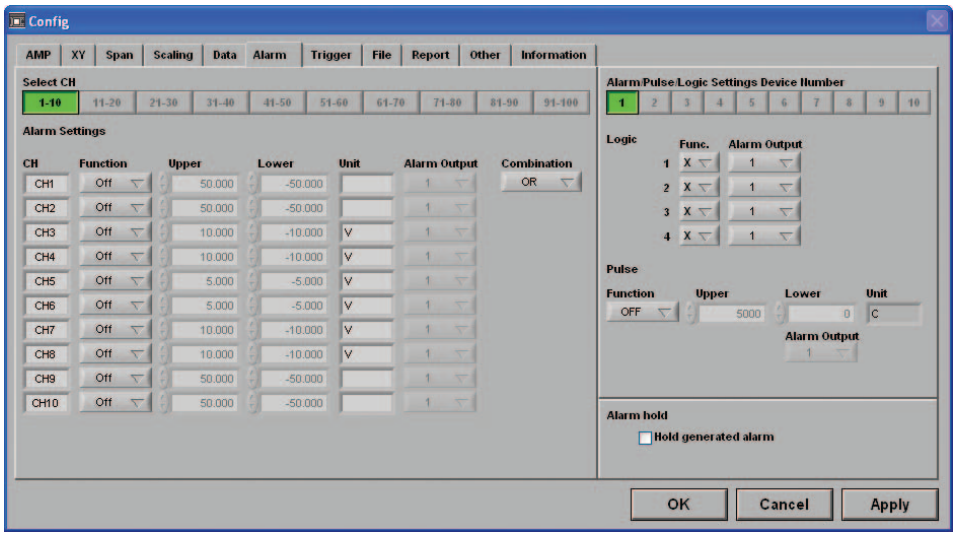
Create Backup File: Check this box for auto data backup.

Backup Interval: 1, 2, 6, 12, 24 hours
Specifies the backup interval.

CHECKPOINT

- The data backup location uses the same file path set in PC Settings. The file name is automatically assigned.
- PC Settings Capture File Name _xx_bk.GBD (xx: consecutive numbers).

Alarm



(1) Select CH

Specify a group or groups of channels in the range [1 to 10] through [91 to 100].

(2) Alarm Settings

Function: Off, Hi, Lo, Win In, Win Out
Specifies the condition for alarm generation.

Upper: Specifies the Upper Limit Value for the condition specified in Function.

Lower: Specifies the Lower Limit Value for the condition specified in Function.

Alarm Output: 1-4
Specifies the number for alarm output to an external device.

Combination: AND, OR
Specifies the condition for alarm output.

(3) Logic, Pulse Settings

Device Number: Specifies which of the connected devices to use for logic input.

Logic

- Func.: X (not used)
  L (enabled when the signal goes low)
  H (enabled when the signal goes high)
- Alarm Output: 1-4
  Specifies the number for alarm output to an external device.

Pulse

- Function: Off, Hi, Lo
  Specifies the condition for alarm generation.
- Upper: Specifies the Upper Limit Value for the condition specified in Function.
- Lower: Specifies the Lower Limit Value for the condition specified in Function.
- Alarm Output: 1-4
  Specifies the number for alarm output to an external device.

CHECKPOINT

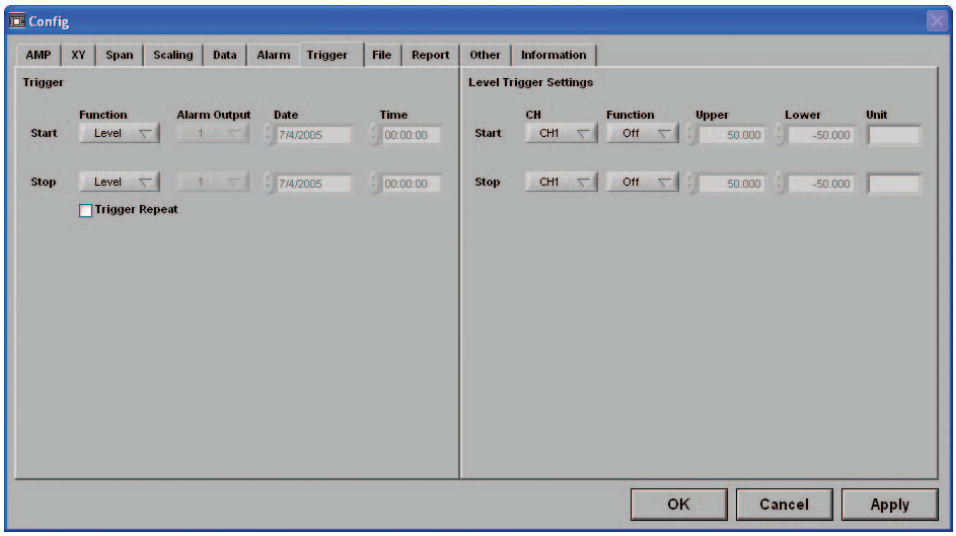
Please refer to "④ ALM Settings Window" on page 3-17 for further details.

(4) Alarm hold

Hold generated alarm:
When an alarm is generated, the alarm status is maintained unless the Alarm Cancel function is used.

Trigger

The trigger Start/Stop settings are made here.



Trigger Settings/Level Trigger Settings

Start

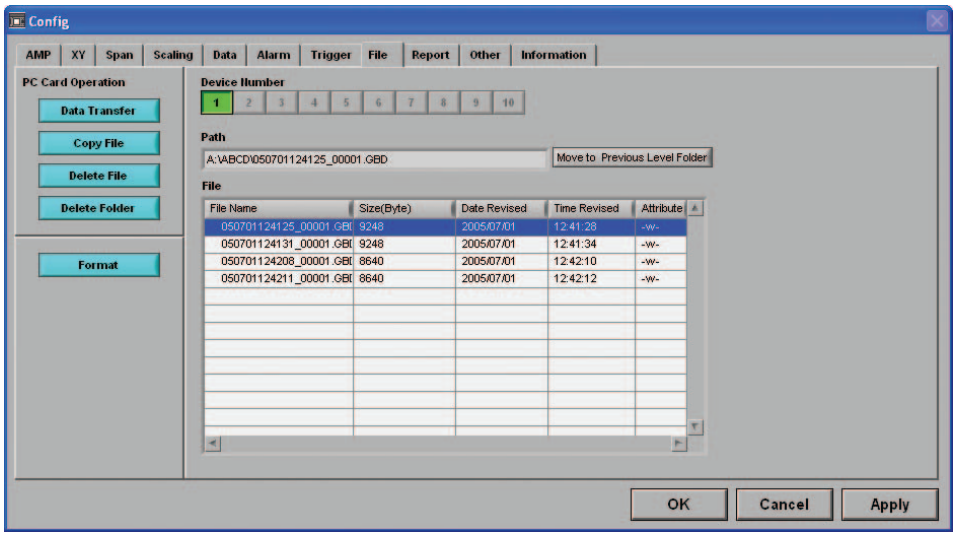
- Function: Sets the Data Capture Start condition.
  - Off: No trigger is used. Instead, measurement is initiated by pressing the START/STOP key.
  - Level: The start of measurement is triggered when the trigger condition is satisfied.
  - Alarm: The start of measurement is triggered with the alarm condition is satisfied.
  - Specified Time: (When Repeat Trigger is Off) Measurement starts (data capture starts) at the specified date and time. (When Repeat Trigger is On) Measurement starts (data capture starts) at the specified time.
  - External: The start of measurement is triggered when a signal is input from an external trigger terminal.
- Alarm Output: Selects the alarm output when the Function is Alarm.

Stop

- Function: Sets the Data Capture Stop condition.
  - Off: No trigger is used. Instead, measurement is stopped by pressing the START/STOP key.
  - Level: Measurement is stopped when the trigger condition is satisfied.
  - Alarm: Measurement is stopped when the alarm condition is satisfied.
  - Specified Time: (When Repeat Trigger is Off) Measurement stops (data capture stops) at the specified date and time. (When Repeat Trigger is On) Measurement stops (data capture stops) at the specified time.
  - External: Measurement is stopped when a signal is input from an external trigger terminal.
  - Time: Sets the amount of time from the start until the end of measurement. (The time can be specified in 1- second increments).
- Alarm Output: Selects the alarm output when the Function is Alarm.
- Date, Time: Make these settings if "Specified Time" was selected for Function. If Off was specified for Repeat Trigger, both Date and Time can be specified, but if On was specified for Repeat Trigger, only Time can be selected.
- Time: Sets the end time when "Function" and "Time" have been set.
- Trigger Repeat: Measurement is restarted after the stop trigger is generated.

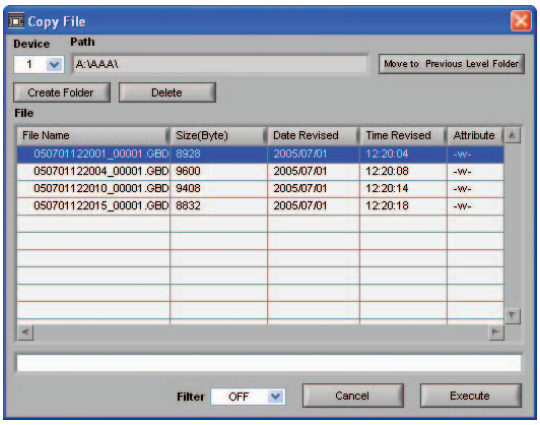
File

The settings related to files are made here.



(1) Data Transfer
Data captured at the GL450 can be transferred to a computer. Select the required file from the File List, and click the "Data Transfer" button to transfer the data to the specified location.

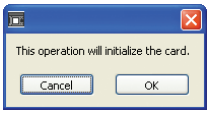
(2) Copy File
Data captured at the GL450 can be copied to another destination. Click the "Copy File" button to display the menu for selecting the file to be copied and the copy destination.



(3) Delete File
Data captured at the GL450 can be deleted. Select the file you want to delete and then click the "Delete File" button to delete it.

(4) Delete Folder
Folders created at the GL450 can be deleted. Select the folder you want to delete and then click the "Delete Folder" button to delete it.

(5) Format
When you click the "Initialize Card" button, a confirmation dialog box will be displayed. Click the OK button to start the initialization process.



The PCMCIA card will be initialized. All the data captured to the card will be erased. Be sure to make a data backup before initializing the card.

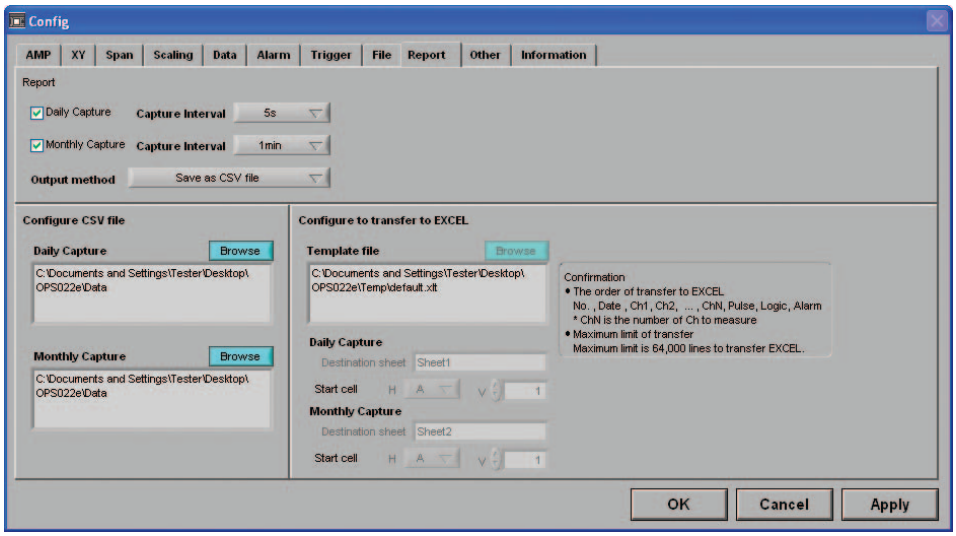
(6) Device Number
Select the devices for Synchronized measurement.

(7) Path
Select a data capture folder saved to the PCMCIA card in the GL450 card slot.

(8) File
Select a data capture file saved to the PCMCIA card in the GL450 card slot.

Report

Daily or monthly reports can be generated during data measurement.



(1) Report

Daily Capture: Check this box to enable report data to be generated daily.

Capture Interval: 1, 5, 10, 30 seconds, 1, 5, 10, 30 minutes
A daily capture file is automatically created for the measured data according to the capture interval specified.

Monthly Capture: Check this box to enable report data to be generated monthly.

Capture Interval: 1, 5, 10, 30 minutes, 1, 2, 6, 12, 24 hours
A monthly capture file is automatically created for the measured data according to the capture interval specified.

Output method: Select the output format. Save the data as a CSV file, or export it to a direct Excel file.

(2) Configure CSV file

Daily Capture (Save Destination Folder):
Specifies the folder for saving daily capture data. The file name becomes "Daily Date Time.csv".

Monthly Capture (Save Destination Folder):
Specifies the folder for saving monthly capture data. The file name becomes "Monthly Date Time.csv".

(3) Configure to transfer to Excel

Template file: Specifies the Excel file for export.

CHECKPOINT

- There are several templates stored in the Temp folder contained in the installed OPS022 folder. Use one of these templates or create your own template if desired.
- Daily capture and monthly capture data can be exported to separate sheets in the same Excel file.

Daily Capture:

- Export Destination Sheet:
  Specifies the export sheet name for the Excel file specified by the template file.
- Start Cell: Specifies the start cell position on the export sheet.

Monthly Capture:

- Export Destination Sheet:
  Specifies the export sheet name for the Excel file specified by the template file.

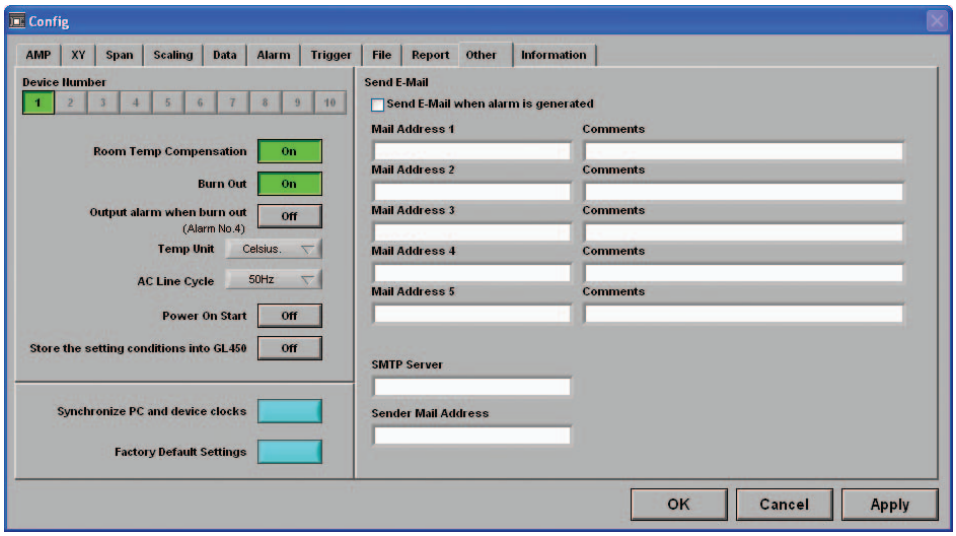
• Start Cell: Specifies the start cell position on the export sheet.

CHECKPOINT

- Take care with the data sequence (No., Date, Ch1, Ch2, ..., CHN, Pulse, Logic, Alarm: CHN is determined by the number of data capture channels).
- This function can only be used if the Microsoft Excel software program is installed in your computer.
- There is a limit to the amount of data that can be exported. The maximum number of data points is 64000.

Other

The GL450 device settings and email settings when an alarm has been generated are made here.



(1) Device Number
Specifies the Device Control Number for settings.

(2) Room Temp Compensation: Off, On
This function is only used when a temperature range has been specified. "On" is normally selected. When making this setting, there is a choice between Internal (the GL450's room temperature compensation settings are used) or External. Select External when you have the necessary equipment and know-how.

(3) Burn Out: Off, On
This function is only used when a temperature range has been specified. It is normally set to "On". When a thermocouple sensor has burnt out, that status is displayed on the screen.

(4) Output alarm when burn out (Alarm Number 4)
Alarm number 4 is output if a burnout occurred during temperature measurement.

(5) Temp Unit: Celsius (°C), Fahrenheit (°F)
Select the setting that you want to be displayed during temperature measurement.

(6) AC Line Cycley
Select the AC line frequency that matches the one normally used.

(7) Power On Start: Off, On
This function enables the settings that were in effect when measurement last ended to be used to start measurement as soon as the power is switched on. (Data being measured using the OPS022 software cannot be captured when the Power On Start function is used).

CHECKPOINT

- If Power On Start is used to activate the GL450 and then the device is connected using the OPS022 application, the OPS022 status is displayed during data capture (waveforms are not displayed).
- If Power On Start is enabled while the device is being connected using the OPS022 application, restart the OPS022 connection procedure (disconnect and then reconnect).

(8) Store the setting conditions into GL450: On (save settings), Off (do not save settings)
This parameter selects whether or not to save the software settings to the GL450.

(9) Synchronize PC and device clocks
Click this button to change the GL450's clock setting to match that of the computer.

(10) Factory Default Setting
This parameter returns all the settings to the factory defaults. Use this function when you want to start from scratch.

(11) Send E-mail

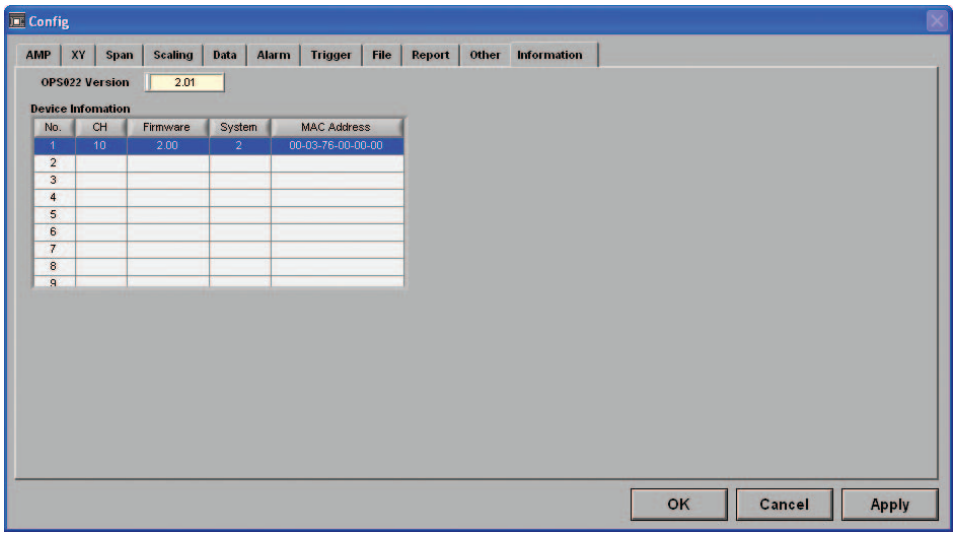
Send E-mail when an alarm is generated: Check this box to enable this function.

Mail Address: Email can be sent to five locations.
Please set the addresses in accordance with your computer system.

Comments: Comments can be recorded for each email setting to explain the contents.
(Email is actually sent when an alarm is generated.)

Information

The device status control information is displayed. This information can be used for maintenance purposes, but it cannot be input directly.

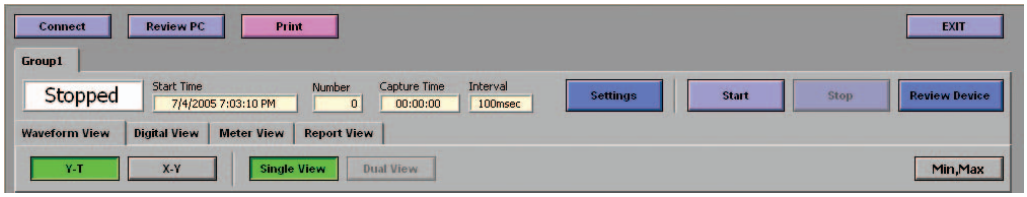


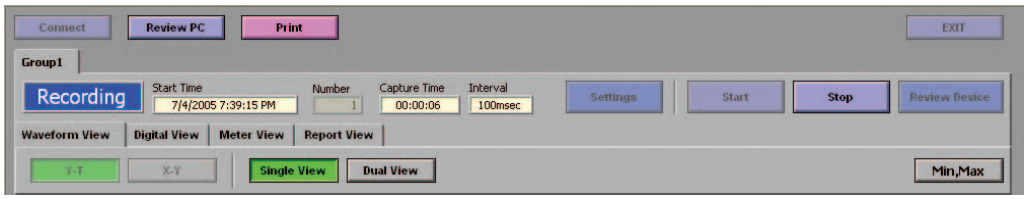
4.9 View Functions

The display can be changed to suit the type of measurement being performed. It is also used to perform measurements and make settings.

Capture Start/Stop

When the measurement conditions have been set, waveforms are displayed even though "Finished" is displayed. However, when the GL450 is connected to a computer, the waveforms are monitored. If "Start" is selected in this status, the display changes to "Recording", and measurement starts according to the settings made in the setting menus.





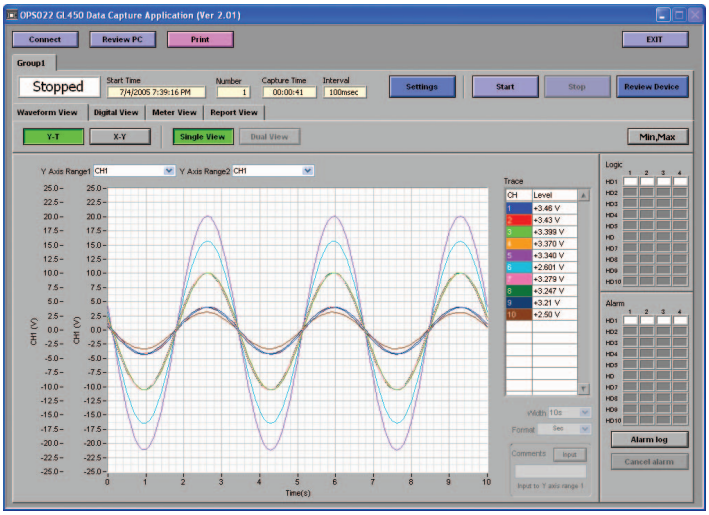
Waveform View

The waveform view "Y-T" display can be selected as "Single View" or "Dual View". When the GL450 is in on-line status, the measured waveforms are always displayed. Moreover, when data capture has been started, the data is captured according to the settings made in the setting menus.

Y-T

Measurements can be displayed with respect to the time axis.

(1) Single View Display
The X axis is the time axis, and the Y axis displays the measurement range specified for each channel.



Y Axis Range 1, 2: The Y axis scale can be displayed as the scale for two channels.

Channel: If a channel's color display is clicked to turn it off, the waveform for that channel will not be displayed.

X-axis Display Width: The time axis width can be changed if the numeric value is changed.

Note: Measurement data is captured.

Format: Second, Relative Time, or Absolute Time can be selected for the X-axis display.

Comment Function: During data capture, a comment can be input above the Y axis range 1 waveform. Comments that were input can be checked during a Review PC operation, and can also be changed or added to if required.

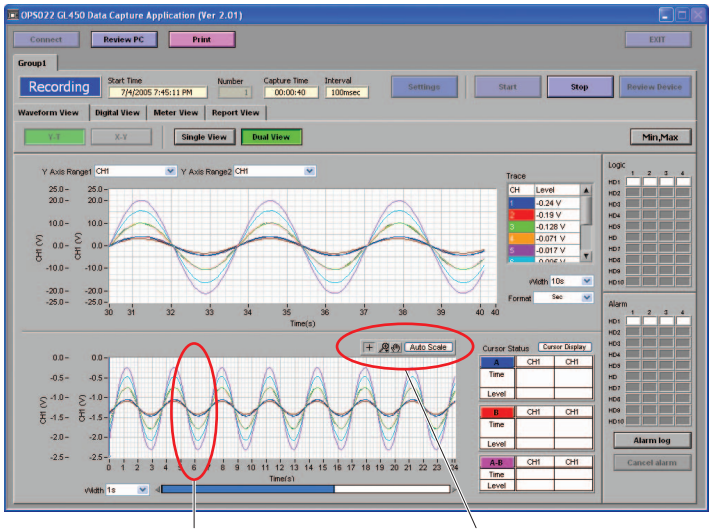
Note: This function is only enabled during data capture.

(2) Dual View Display

Data captured in the past can be displayed alongside the data that is currently being captured.

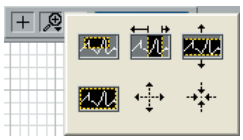
Note: This function can only be used while data is being captured.

Past data can be enlarged and checked using the on-screen cursors.


When the display is Dual View, the cursor display can be used to search data.
Cursor, Enlarge/Compress, Move Display, Auto Scale

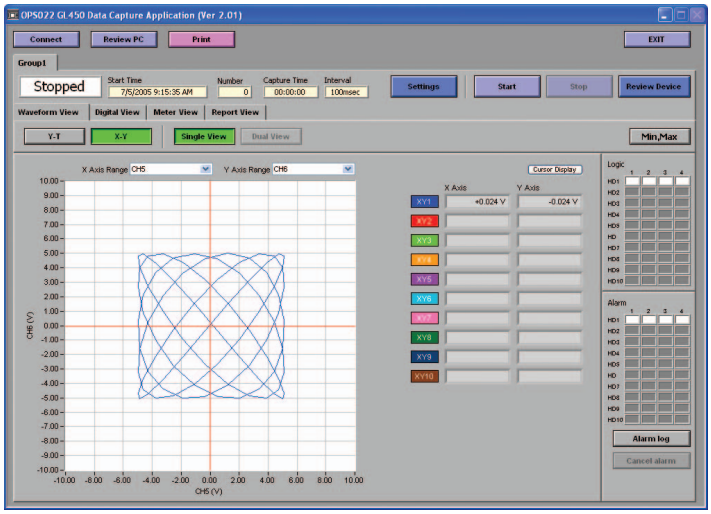
Click on the "Cursor", "Enlarge/Compress", "Move Display" and "Auto Scale" icons to select them.

"Enlarge/Compress" selection screen.



X-Y

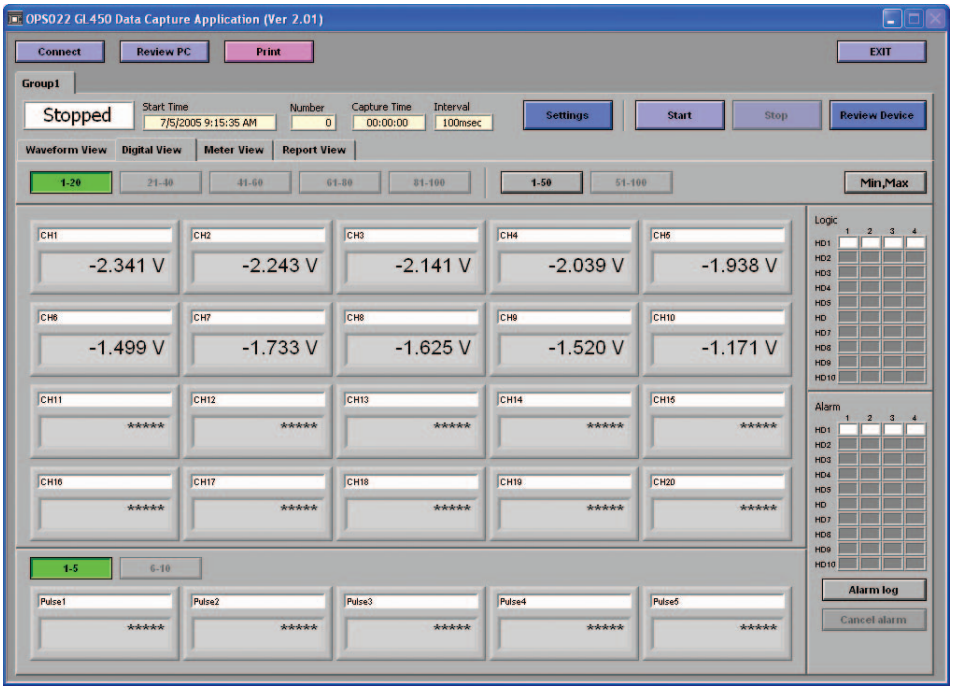
The X axis can be combined with a Y axis for an X-Y display. Specify the X and Y channels in "XY" under "Settings".



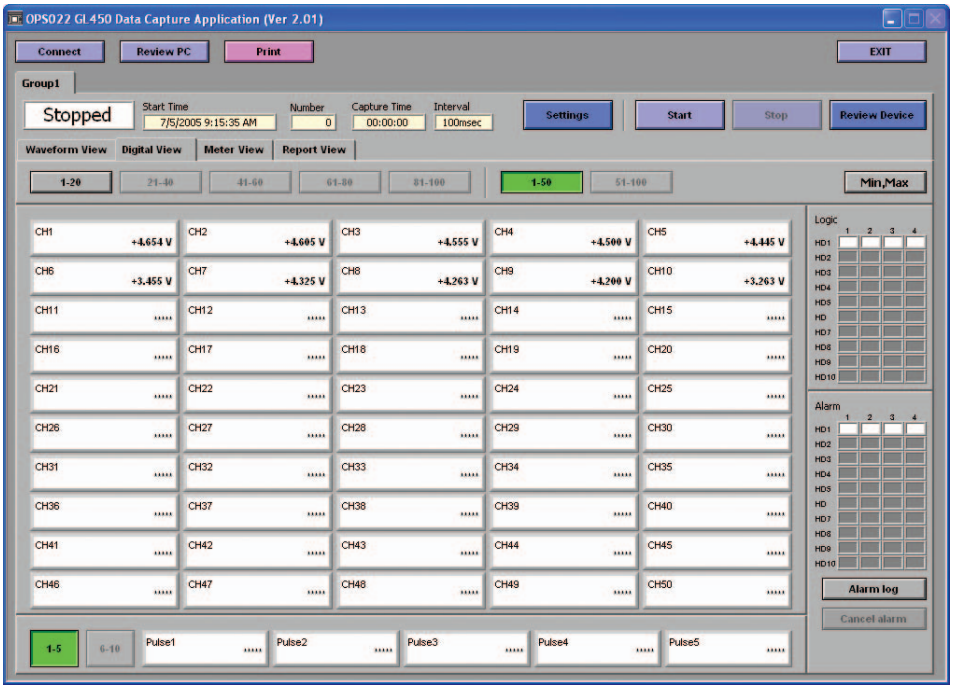
Digital View

Digital data can be displayed separately for each group. If the group is a 20-channel group, pulse measurements can also be displayed. For a 50-channel group, however, only digital is displayed.

(1) 20-channel group displays: 1 to 20, 21 to 40, 41 to 60, 61 to 80, 81 to 100.



(2) 50-channel group displays: 1 to 50, 51 to 100.

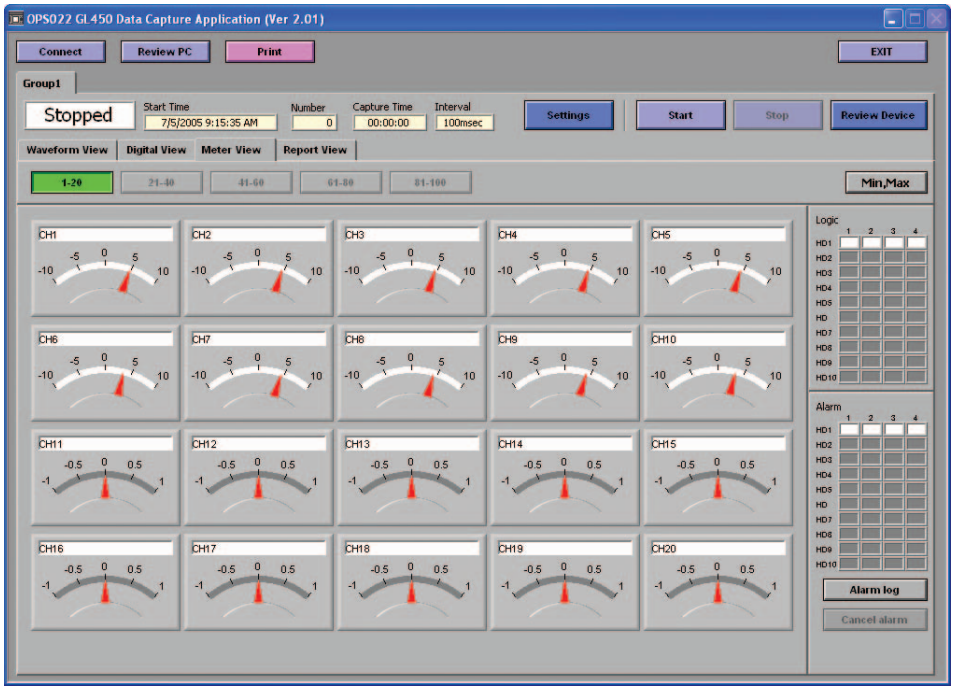


CHECKPOINT

Only the channels in the input terminal units that are installed in the GL450 are displayed. "*****" is displayed for channels that are not installed.

Meter View

The measured data is displayed in a meter format. Use this view when you want to monitor the status with the feeling of using an analog meter. Moreover, this display can be changed in group lots.

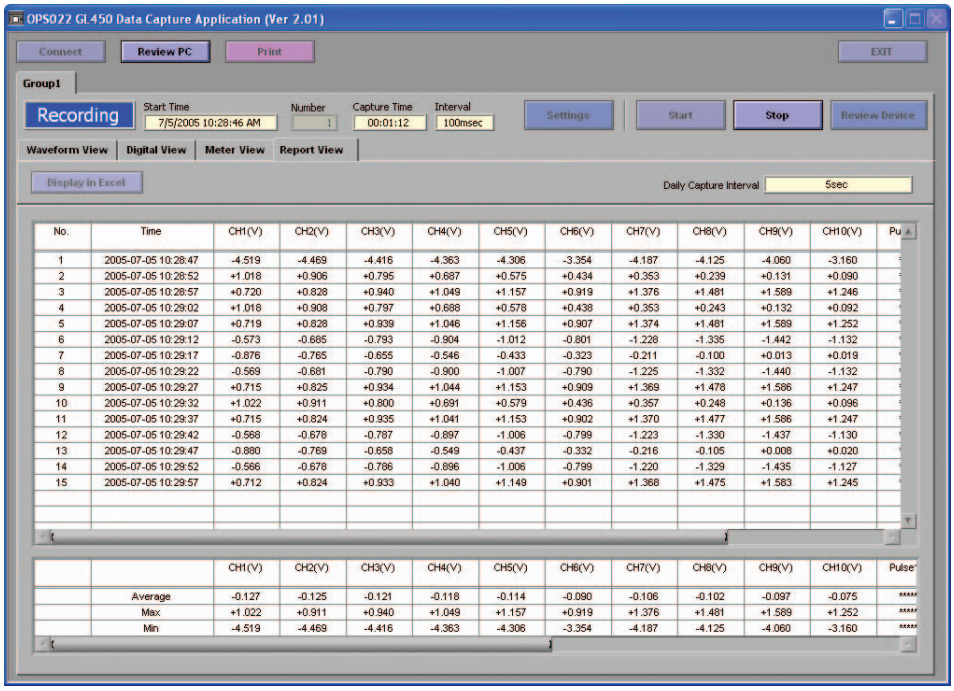


CHECKPOINT

The alarm setting ranges are displayed in red in the Meter View screen.

Report View

If the Daily Capture Processing and Monthly Capture Processing checkboxes in SettingsÅ^Report were checked, the captured data is displayed on the screen in daily capture processing intervals. Moreover, the daily capture and monthly capture data are saved in the specified format.



CHECKPOINT

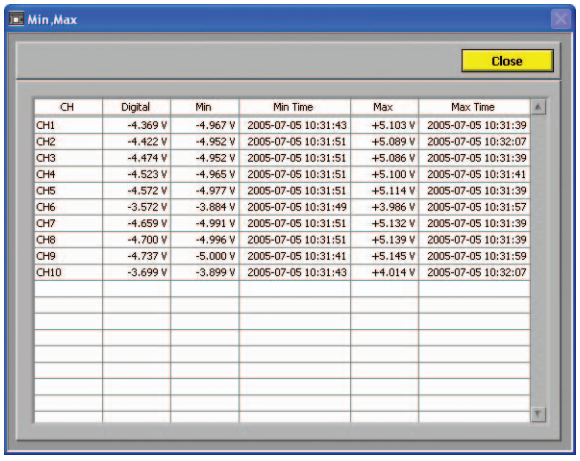
To change the setting, change the "Capture Interval" and the "Capture Destination Folder" settings in the "Report" tab screen in the Settings menu.

Print

This function enables waveforms to be printed. The required settings must be made at the printer in advance. If settings have been made for several printers, output is made to the active printer.

Minimum/Maximum

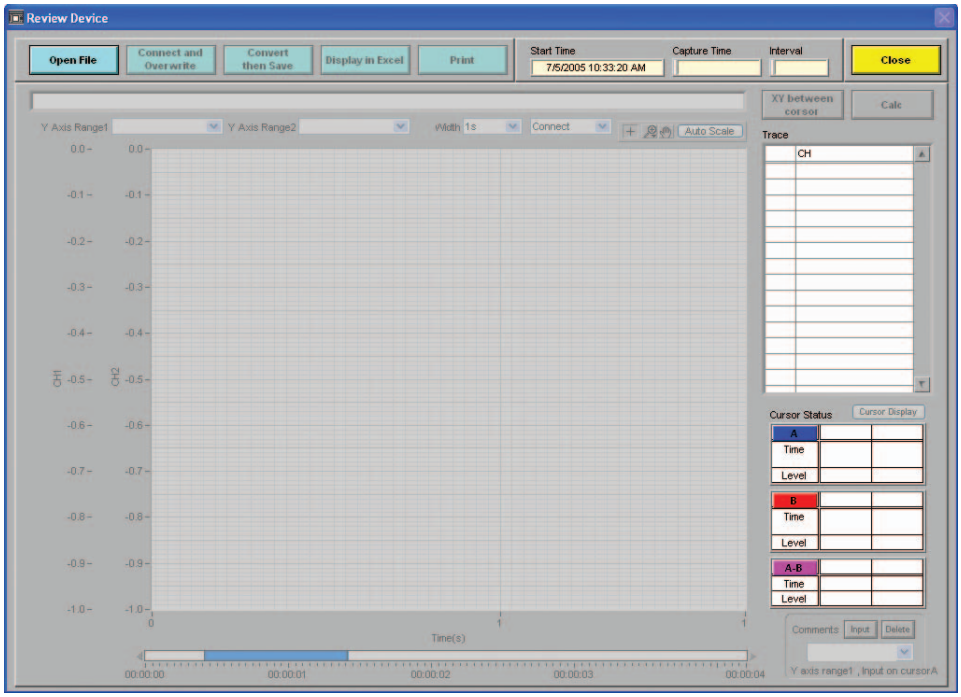
While data is being captured, the following data information for the measurement channels is displayed:
CH, current value, minimum value, minimum value time, maximum value, maximum value time.



4.10 Review Device

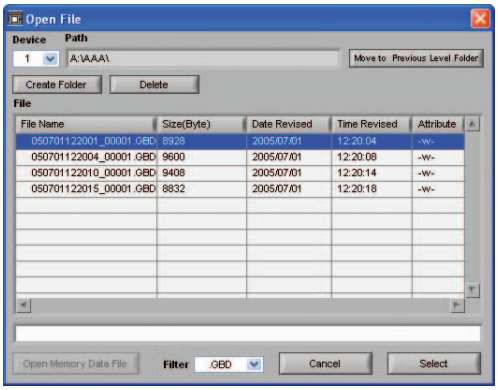
Use this function to replay the data captured at the GL450. The captured data can be replayed when the GL450 is in online status.

Put the GL450 in online status, insert a PCMCIA card in the PCMCIA card slot, and then click the "Review Device" button to start data replay. When the "Review Device" button is clicked, the Review Device submenu appears.



Opening a File

(1) Click the "Open File" button to display the data files on the PCMCIA card.

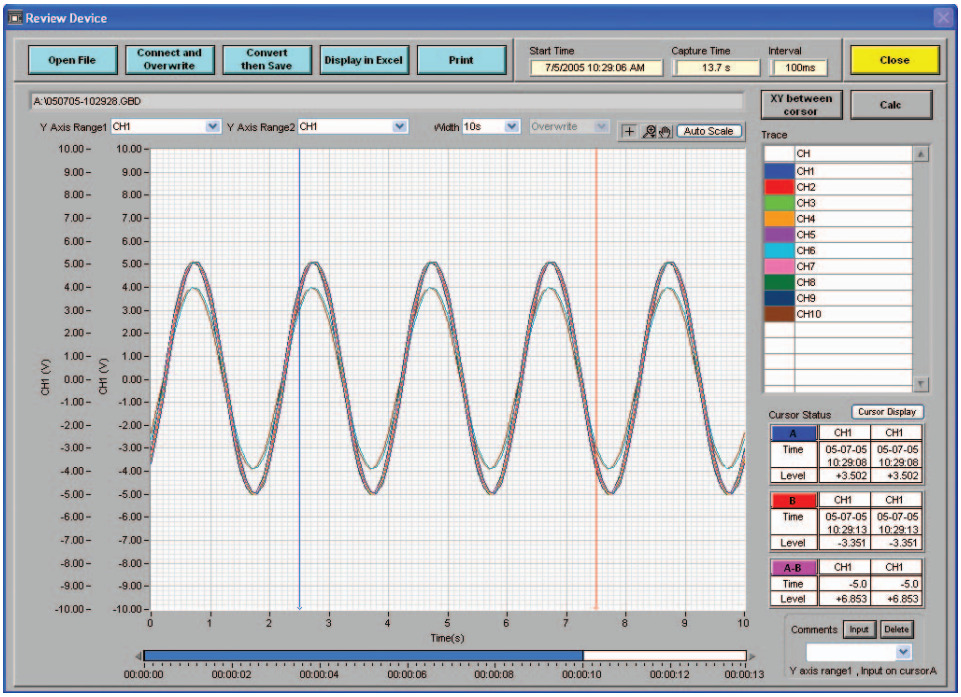


Open Memory Data File: Click this button to replay the data captured to the GL450's internal memory. (Cannot be selected if there is no data in the internal memory).

Filter: Displays the replayable file formats (extensions).

GBD: Data saved to the PCMCIA card.

(2) Select the file to be displayed. The data is displayed on the screen. If waveforms are displayed, the data can be checked and converted if required.



- The capture Start Time, Capture Time, and Capture Interval are displayed at the upper right of the screen. Moreover, the selected file name is displayed in the upper part of the waveform display.
- Two Y Axis. channel ranges can be displayed for Specify the channels as required.
- Waveform Display
  If a waveform display color within the Trace list is clicked once, the waveform display for that channel disappears. Click the color once more to redisplay it. Use this function when you need to distinguish between overlapped waveforms.
- Waveform Display Range
  A scroll bar is displayed underneath the waveform display to indicate which part of the data is displayed. Simply move the scroll bar to the required position for fast display of that data.
- Cursor Status
  Two cursors, A and B, are displayed. The cursor information for the selected two waveform channels is displayed at the lower right.

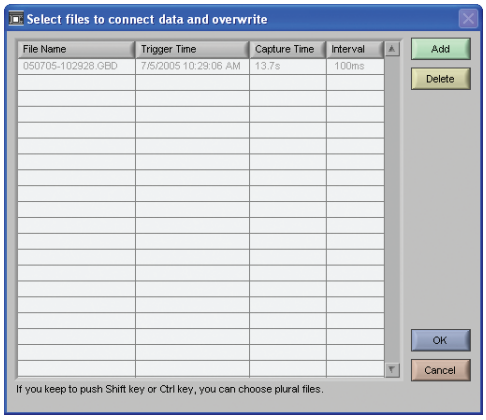
CHECKPOINT

The cursor status waveform data information is for the channels specified for the Y axis ranges 1 and 2.

- Comment Input Function
  A comment can be input above Cursor A (blue) of the channel specified for Y axis range 1. Moreover, the comment name that was input during data capture can be changed or moved as required.

Superimpose/Link

A file can be opened on top of data that is already opened, enabling the superimposed display of multiple data. In addition, multiple data can be linked and displayed

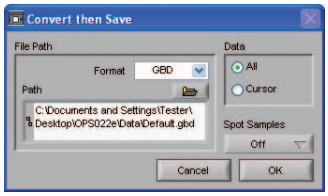


(1) Add: Selects a binary file on the computer.

(2) Delete: Deletes the file that was added.

Convert Then Save

After data has been converted, click the "Convert Then Save" button to display the following submenu.



(1) Format

GBD: GL450 dedicated binary format.

Note: Use this format if you want to replay the captured data via the OPS022 software.

CSV: A TXT format for processing data in Excel.

Note: If the CSV file was created using the OPS022 software or at the GL450, it can be opened via the OPS022 software.

(2) Path: Specifies the data capture location for the converted data.

(3) Data

All: All the measured data is converted.

Cursor: Only the data between the A and B cursors is converted.

(4) Spot Samples

Off: Spot sampling is not performed

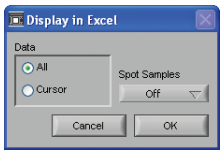
2, 5, 10, 20, 50, 100, 200, 500, 1000: Data is sampled at the point interval specified.

Display in EXCEL

This function displays the captured data being displayed in Excel format.

CHECKPOINT

This function cannot be used unless the Microsoft Excel software program is installed in your computer.



(1) Data

All: All the measured data is converted.

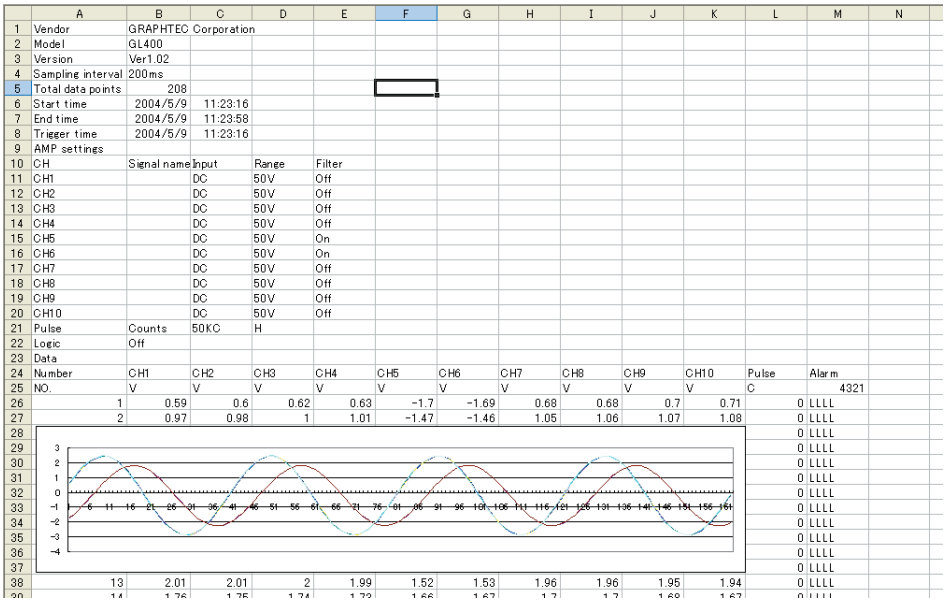
Cursors: Only the data between the A and B cursors is converted.

(2) Spot Samples

Off: Spot sampling is not performed

2, 5, 10, 20, 50, 100, 200, 500, 1000: Data is sampled at the point interval specified.

Example



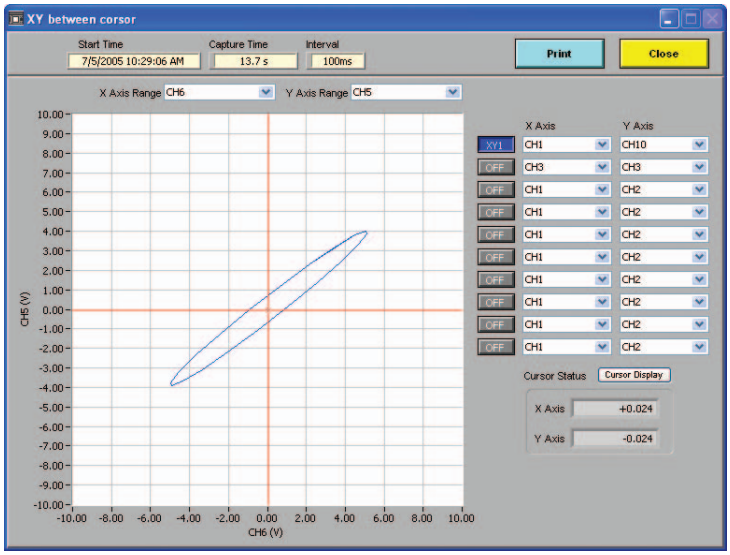
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Vendor	GRAPHTEC	Corporation											
2	Model	GL400												
3	Version	Ver1.02												
4	Sampling interval	200ms												
5	Total data points	208												
6	Start time	2004/5/9	11:23:16											
7	End time	2004/5/9	11:23:58											
8	Trigger time	2004/5/9	11:23:16											
9	AMP settings													
10	CH	Signal name	Input	Range	Filter									
11	CH1		DC	50V	Off									
12	CH2		DC	50V	Off									
13	CH3		DC	50V	Off									
14	CH4		DC	50V	Off									
15	CH5		DC	50V	On									
16	CH6		DC	50V	On									
17	CH7		DC	50V	Off									
18	CH8		DC	50V	Off									
19	CH9		DC	50V	Off									
20	CH10		DC	50V	Off									
21	Pulse	Counts	50KC	H										
22	Logic	Off												
23	Data													
24	Number	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	CH9	CH10	Pulse	Alarm	
25	NO.	V	V	V	V	V	V	V	V	V	V	C	4321	
26	1	0.59	0.6	0.62	0.63	-1.7	-1.69	0.68	0.68	0.7	0.71	0	LLLL	
27	2	0.97	0.98	1	1.01	-1.47	-1.46	1.05	1.06	1.07	1.08	0	LLLL	
28												0	LLLL	
29												0	LLLL	
30												0	LLLL	
31												0	LLLL	
32												0	LLLL	
33												0	LLLL	
34												0	LLLL	
35												0	LLLL	
36												0	LLLL	
37												0	LLLL	
38	13	2.01	2.01	2	1.99	1.52	1.53	1.96	1.96	1.95	1.94	0	LLLL	

Print

This function enables waveforms to be printed. The required settings must be made at the printer in advance. If settings have been made for several printers, output is made to the active printer.

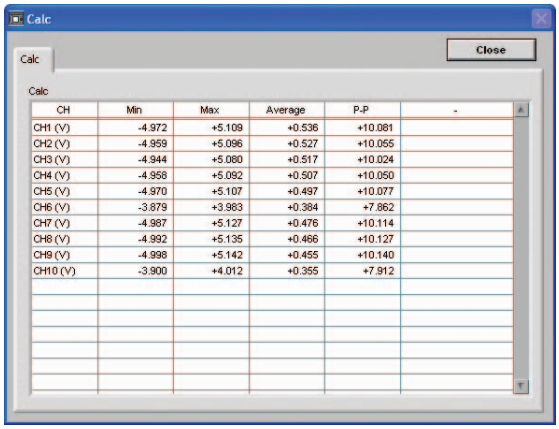
XY Between Cursors Function

This function enables data in the range of Cursors A and B to be displayed as an XY waveform.



Calculation

This function enables data in the range of Cursors A and B to be displayed as Maximum, Minimum, Average, and P-P values for each channel.

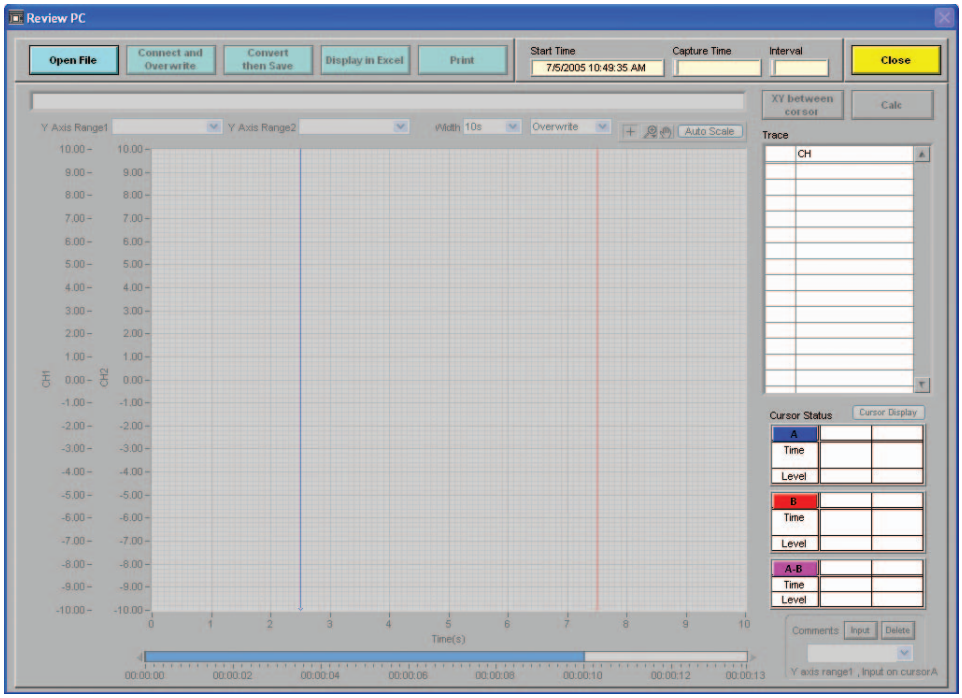


CH	Min	Max	Average	P-P
CH1 (V)	-4.972	+5.109	+0.536	+10.081
CH2 (V)	-4.959	+5.096	+0.527	+10.055
CH3 (V)	-4.944	+5.080	+0.517	+10.024
CH4 (V)	-4.958	+5.092	+0.507	+10.050
CH5 (V)	-4.970	+5.107	+0.497	+10.077
CH6 (V)	-3.879	+3.983	+0.384	+7.862
CH7 (V)	-4.987	+5.127	+0.476	+10.114
CH8 (V)	-4.992	+5.135	+0.466	+10.127
CH9 (V)	-4.998	+5.142	+0.455	+10.140
CH10 (V)	-3.900	+4.012	+0.355	+7.912

4.11 Review PC

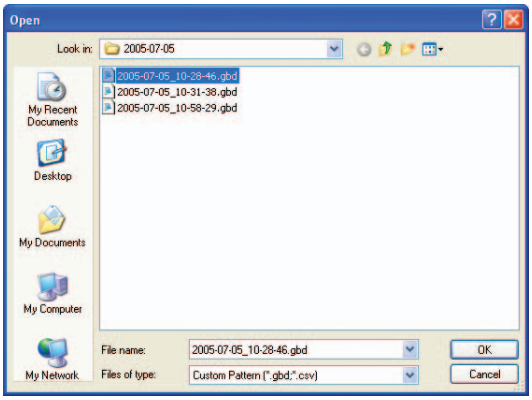
This function replays the data captured in the computer. Data can be replayed in online or offline status.

Replay the data captured in the computer. Click the "Review PC" button to display the Review PC submenu.

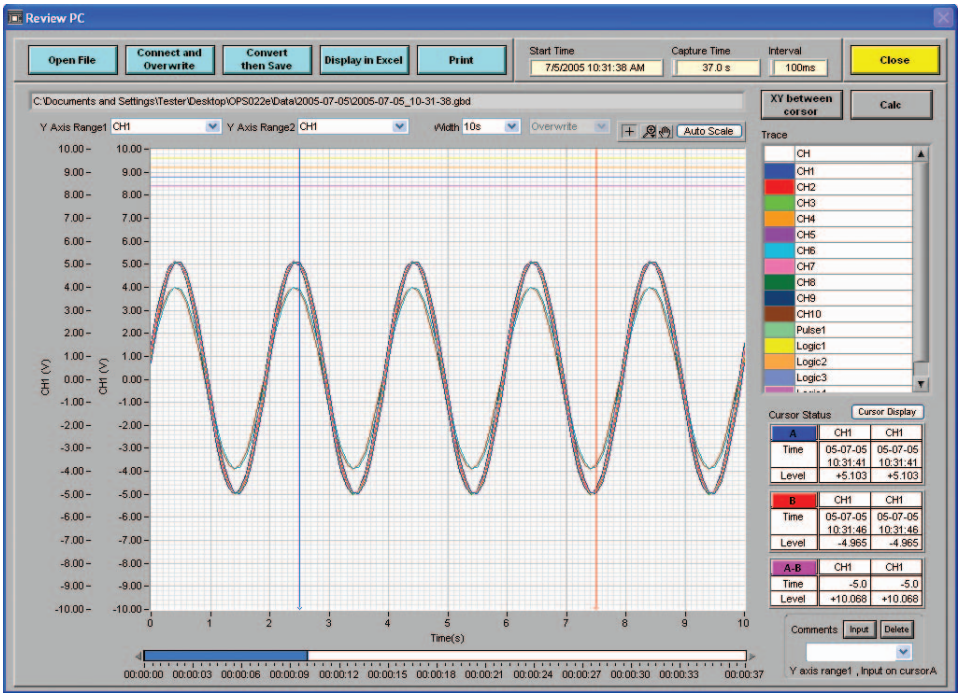


Opening a File

(1) Click the "Open File" button to display the connected PC's data files.



(2) Select the file to be displayed, and then click the OK button. If waveforms are displayed, the data can be checked and converted if required.



- The capture Start Time, Capture Time, and Capture Interval are displayed at the upper right of the screen. Moreover, the selected file name is displayed in the upper part of the waveform display.
- Two Y Axis. channel ranges can be displayed for Specify the channels as required.
- Waveform Display
  If a waveform display color within the Trace list is clicked once, the waveform display for that channel disappears. Click the color once more to redisplay it. Use this function when you need to distinguish between overlapped waveforms.
- Waveform Display Range
  A scroll bar is displayed underneath the waveform display to indicate which part of the data is displayed. Simply move the scroll bar to the required position for fast display of that data.
- Cursor Status
  Two cursors, A and B, are displayed. The cursor information for the selected two waveform channels is displayed at the lower right.

CHECKPOINT

The cursor status waveform data information is for the channels specified for the Y axis ranges 1 and 2.

- Comment Input Function
  A comment can be input above Cursor A (blue) of the channel specified for Y axis range 1. Moreover, the comment name that was input during data capture can be changed or moved as required.

Superimpose/Link

The procedure for using the Superimpose and Link functions is the same as for "Review Device". Please refer to Section 4.10, "Review Device".

Convert Then Save

The procedure for converting the displayed data is the same as for "Review Device". Please refer to Section 4.10, "Review Device".

Display In EXCEL

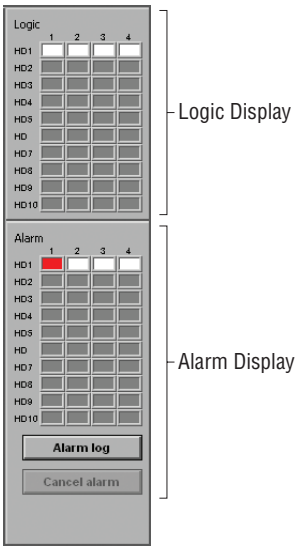
The procedure for displaying the data in Excel format is the same as for "Review Device". Please refer to Section 4.10, "Review Device".

Print

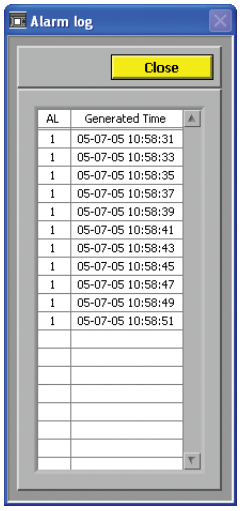
The procedure for using the Print function is the same as for "Review Device". Please refer to Section 4.10, "Review Device".

4.12 Logic, Alarm Display

When the GL450 is in online status, the logic (4 channels) and alarm (4 channels) status can be monitored on-screen. Logic data can also be monitored as waveforms.



Alarm log Screen



(1) Alarm log Screen

Alarm History: If an alarm is generated after data capture has started, this function enables you to check the channel and time.

Alarm Cancel: This function enables the alarm to be reset if an alarm was generated when the Alarm Hold setting was specified.

CHAPTER 5

Specifications

This chapter describes the basic specifications for the GL450.

5.1 Standard Specifications
5.2 Function Specifications
5.3 Accessory/Option Specifications
5.4 External Dimensions

5.1 Standard Specifications

Standard Specifications

<table>
<tr><th>Item</th><th>GL450</th></tr>
<tr><td>Number of analog input terminal units mountable</td><td>2 units (10 channels x 2 or 20 channels x 2)</td></tr>
<tr><td>External input/output</td><td>Trigger input, Logic input, Pulse input, Alarm output,
synchronized main unit signals (sampling, trigger, etc.)</td></tr>
<tr><td>PC interface</td><td>Ethernet (10 Base-T/100 Base-TX); USB (Ver. 2.0) standard</td></tr>
<tr><td>Internal memory devices</td><td>2 Mwords internal memory (total); PCMCIA card slot (Type 2) standard</td></tr>
<tr><td>Data backup functions</td><td>Setup conditions: EEPROM; Clock: lithium secondary battery</td></tr>
<tr><td>Operating environment</td><td>0 to 40°C, 30 to 80% RH</td></tr>
<tr><td>Withstand voltage</td><td>1 minute at 350 Vp-p (between each input channel and main unit chassis)</td></tr>
<tr><td>Power supply</td><td>AC adapter: 100 to 240 VAC, 50/60 Hz
DC input: 8.5 to 24 VDC
Battery pack (option): 7.4 VDC (2200 mAh)</td></tr>
<tr><td>Power consumption</td><td>AC power consumption (when the supplied AC adapter is used)
<table>
<tr><th>No.</th><th>Condition</th><th>Normal consumption</th><th>Consumption during battery recharge</th></tr>
<tr><td>1</td><td>When the LCD is ON</td><td>23 VA</td><td>40 VA</td></tr>
<tr><td>2</td><td>When the screensaver is operating</td><td>19 VA</td><td>37 VA</td></tr>
</table>
DC power consumption
<table>
<tr><th>No.</th><th>DC voltage</th><th>Condition</th><th>Normal consumption</th><th>Consumption during battery recharge</th></tr>
<tr><td>1</td><td>+24 V</td><td>When the LCD is ON</td><td>0.35 VA</td><td>0.75 VA</td></tr>
<tr><td>2</td><td>+24 V</td><td>When the screensaver is operating</td><td>0.25 VA</td><td>0.65 VA</td></tr>
<tr><td>3</td><td>+12 V</td><td>When the LCD is ON</td><td>0.65 VA</td><td>Recharging not possible</td></tr>
<tr><td>4</td><td>+12 V</td><td>When the screensaver is operating</td><td>0.4 VA</td><td>Recharging not possible</td></tr>
<tr><td>5</td><td>+8.5 V</td><td>When the LCD is ON</td><td>0.9 VA</td><td>Recharging not possible</td></tr>
<tr><td>6</td><td>+8.5 V</td><td>When the screensaver is operating</td><td>0.6 VA</td><td>Recharging not possible</td></tr>
</table></td></tr>
<tr><td>External dimensions</td><td>212 x 152 x 45 mm</td></tr>
<tr><td>Weight*1</td><td>770 g</td></tr>
<tr><td>Other</td><td>Beeper (key, etc.)
Holes to enable mounting on DIN rails</td></tr>
</table>

1 Excluding the AC adapter and battery; including the 10-channel terminal

Internal memory devices

Item	Description
Memory capacity	Internal memory: 2 Mwords (total) PC card slot: Depends on the type of card used
PC card standard	Type 2
Usable card types	Compact Flash (adapter required) Flash ATA card Memory Stick (adapter required) SD memory card (adapter required) MicroDrive (1 GB) Smart Media (adapter required) HDD card
Memory contents	Setup conditions Measured data Screen copy

PC Interface

Item	Description
Interface types	Ethernet (10 Base-T, 100 Base-TX) USB (Ver. 2.0)
Functions	Data transfer to the PC (realtime, memory) PC control of the GL450
Realtime data transfer speed	0.1 s (10 ch) maximum

Monitor

Item	Description
Display	4.7-inch STN color LCD (320 x 240 dots)
Displayed languages	English, French, Japanese
Backlight life	Approx. 36,000 hours (at 23°C, as a reference)
Backlight	Screen saver function provided (1, 2, 5, 10, 30, 60 min.)
Contrast adjustment	Provided

Input Unit Specifications

Item	Description
Number of input channels channels)	10 channels/terminal unit (2 units mountable for a maximum of 20
Input method	Photo MOS relay scanning system; all channels isolated
Scan speed	0.1s/10 ch maximum
Measurement ranges	Voltage: 20, 50, 100, 500 mV; 1, 2, 5, 10, 20, 50 V; 1-5 V F.S. Temperature • Thermocouples: K, J, E, T, R, S, B, N, W (WRe5-26) • Resistance temperature detector: Pt100, Jpt100 Humidity: 0 to 100% (Voltage 0V to 1V scaling conversion) **Accuracy (see B-530 in the Options section)*
Measurement accuracy (23°C ±3°C) when 30 minutes have elapsed after the power was switched on (filter On, 1 s sampling)	Voltage: 0.1% of F.S.

Thermo couple	Slot (factory shipment status)	Measurement Temperature Range (°C)	Measurement Accuracy
R/S	Slot 1	0 ≤ Ts ≤ 100	±5.2°C
		100 < Ts ≤ 300	±3.0°C
		R: 300 < Ts ≤ 1600°C	±(0.05% of rdg +2.0°C)
		S: 300 < Ts ≤ 1760°C	±(0.05% of rdg +2.0°C)
		Reference contact compensation accuracy	±0.5°C
	Slot 2	0 ≤ Ts ≤ 100	±5.2°C
		100 < Ts ≤ 300	±3.0°C
		R: 300 < Ts ≤ 1600°C	±(0.05% of rdg +2.0°C)
		S: 300 < Ts ≤ 1760°C	±(0.05% of rdg +2.0°C)
		Reference contact compensation accuracy	±1.0°C
B	Slot 1	400 ≤ Ts ≤ 600	±3.5°C
		600 < Ts ≤ 1820°C	±(0.05% of rdg +2.0°C)
		Reference contact compensation accuracy	±0.5°C
	Slot 2	400 ≤ Ts ≤ 600	±3.5°C
		600 < Ts ≤ 1820°C	±(0.05% of rdg +2.0°C)
		Reference contact compensation accuracy	±1.0°C
K	Slot 1	–200 ≤ Ts ≤ –100	±(0.05% of rdg +2.0°C)
		–100 < Ts ≤ 1370°C	±(0.05% of rdg +1.0°C)
		Reference contact compensation accuracy	±0.5°C
	Slot 2	–200 ≤ Ts ≤ –100	±(0.05% of rdg +2.0°C)
		–100 < Ts ≤ 1370°C	±(0.05% of rdg +1.0°C)
		Reference contact compensation accuracy	±1.0°C
E	Slot 1	–200 ≤ Ts ≤ –100	±(0.05% of rdg +2.0°C)
		–100 < Ts ≤ 800°C	±(0.05% of rdg +1.0°C)
		Reference contact compensation accuracy	±0.5°C
	Slot 2	–200 ≤ Ts ≤ –100	±(0.05% of rdg +2.0°C)
		–100 < Ts ≤ 800°C	±(0.05% of rdg +1.0°C)
		Reference contact compensation accuracy	±1.0°C
T	Slot 1	–200 ≤ Ts ≤ –100	±(0.1% of rdg +1.5°C)
		–100 < Ts ≤ 400°C	±(0.1% of rdg +0.5°C)
		Reference contact compensation accuracy	±0.5°C
	Slot 2	–200 ≤ Ts ≤ –100	±(0.1% of rdg +1.5°C)
		–100 < Ts ≤ 400°C	±(0.1% of rdg +0.5°C)
		Reference contact compensation accuracy	±1.0°C
J	Slot 1	–200 ≤ Ts ≤ –100	±2.7°C
		–100 < Ts ≤ 100	±1.7°C
		100 < Ts ≤ 1100°C	±(0.05% of rdg +1.0°C)
		Reference contact compensation accuracy	± 0.5°C
	Slot 2	–200 ≤ Ts ≤ –100	±2.7°C
		–100 < Ts ≤ 100	±1.7°C
		100 < Ts ≤ 1100°C	±(0.05% of rdg +1.0°C)
		Reference contact compensation accuracy	±1.0°C
N	Slot 1	0 ≤ Ts ≤ 1300°C	±(0.1% of rdg +1.0°C)
		Reference contact compensation accuracy	±0.5°C
	Slot 2	0 ≤ Ts ≤ 1300°C	±(0.1% of rdg +1.0°C)
		Reference contact compensation accuracy	±1.0°C
W	Slot 1	0 ≤ Ts ≤ 2315°C	±(0.1% of rdg +1.5°C)
		Reference contact compensation accuracy	±0.5°C
	Slot 2	0 ≤ Ts ≤ 2315°C	±(0.1% of rdg +1.5°C)
		Reference contact compensation accuracy	±1.0°C

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Measurement accuracy
(23°C ±3°C)
when 30 minutes have elapsed after the power was switched on
(filter On, 1 s sampling)</td><td>
<table>
<tr><th>Thermo couple</th><th>Slot
(factory shipment status)</th><th>Measurement Temperature Range (°C)</th><th>Measurement Accuracy</th></tr>
<tr><td rowspan="2">Resistance Temperature Detector</td><td>Slot 1</td><td>Pt 100: –200 to 850
JPt 100: –200 to 500</td><td>±(0.05% of F.S +0.5°C)
Pt: F.S = 1050°C
JPt: F.S = 700°C</td></tr>
<tr><td>Slot 2</td><td>Pt 100: –200 to 850
JPt 100: –200 to 500</td><td>±(0.05% of F.S +0.5°C)
Pt: F.S = 1050°C
JPt: F.S = 700°C</td></tr>
</table>
Slot 1 is the factory shipment status.
</td></tr>
<tr><td>Reference contact compensation accuracy</td><td>Internal/External switching</td></tr>
<tr><td>A/D converter</td><td>16 bits (out of which 14 are internally acknowledged)</td></tr>
<tr><td>Temperature coefficient</td><td>Gain: 0.01% of F.S./ °C</td></tr>
<tr><td>Input resistance</td><td>1 MΩ ±5%</td></tr>
<tr><td>Allowable signal source resistance</td><td>Within 300 Ω</td></tr>
<tr><td>Maximum permissible input voltage</td><td>Between +/– terminals: 60 Vp-p
Between input terminals and casing: 60 Vp-p</td></tr>
<tr><td>Withstand voltage</td><td>Between input terminals and casing: 1 minute at 350 Vp-p</td></tr>
<tr><td>Insulation resistance</td><td>At least 50 MΩ (at 500 VDC)</td></tr>
<tr><td>Common mode rejection ratio</td><td>At least 90 dB (50/60 Hz; signal source 300 Ω or less)</td></tr>
<tr><td>Noise</td><td>At least 48 dB (with +/– terminals shorted)</td></tr>
<tr><td>Filter</td><td>On, Off (software filter)</td></tr>
</table>

5.2 Function Specifications

Standard Specifications

Item	Description
Display screen	Waveform display: Waveform screen + Digital screen, Waveform screen Digital display: Waveform screen + Digital screen, Calculation Display screen, Digital screen ***Note: Can be key-toggled***
Sampling interval*1	100, 200, 500 ms; 1, 2, 5, 10, 20, 30 s; 1, 2, 5, 10, 20, 30 min; 1 h
Waveform expansion /contraction	Time axis: 1, 2, 5, 10, 20, 30 sec/Div 1, 2, 5, 10, 20, 30 min/Div 1, 2, 5, 10, 20, 30 h/Div Voltage axis: variable span
Scaling function	4 points can be set for each channel
Review function	Data replay during data capture (dual-screen display)
Data save functions	Capture to internal memory Capture to internal memory and automatic save to a PC card Direct capture to a PC card The setup data can be saved to the PC card Copy of data screen saved to a PC card
Statistical calculation	Types of operation: Average value, peak value, maximum value, minimum value, RMS Number of operations: A maximum of 4 can be set simultaneously for 2 channels each Method: Realtime operation ***Note: When the Calculation Display screen has been specified, the calculation results are displayed.***
Search functions	Function: Search the captured data for the required number of points Search type: Alarm search
Annotation input function	Function: A comment can be input for each channel Inputtable characters: Alphanumerics Number of characters: 11
Linked unit operation	Synchronized operation enabled by the use of synchronous cables to link two or more main units together (PC measurement) Synchronized operations: Start/stop, trigger, reference clock ***Note: If the sampling interval is the same for all the units, the reference clocks are synchronized to enable long-term measurement without any time lag.***

****1 The sampling interval varies according to the number of channels used.***
10 ch: 100 ms; 20 ch: 200 ms; 30/40/50 ch: 500 ms; 60 channels or more: 1 s

Trigger Functions

Item	Description
Repeat Trigger	Off, On
Trigger types	Start: Data capture starts when a trigger is generated. Stop: Data capture stops when a trigger is generated.
Trigger conditions	Start: Off, Level, Alarm, Specified time Stop: Off, Level, Alarm, Specified time, Time
Alarm judgment modes	Analog, Logic, Pulse AND, Pulse OR • Analog: H, L, Window In, Window Out • Logic: 4-ch pattern • Pulse: H, L

External Input/Output Functions

Item	Description
Input/output types	Trigger input (1 ch), Logic input (4 ch), Pulse input (1 ch), Alarm output (4 ch)
Input specifications	Maximum input voltage: +24V Input threshold voltage: Approx. +2.5V Hysteresis: Approx. 0.5 V (+2.5 to +3 V)
Alarm output specifications	Output format: Open collector output (100 kΩ pull-up resistance) Output conditions: Level judgment, window judgment, logic pattern judgment, pulse judgment
Pulse input	Revolutions mode (engines, etc.) • Function: Counts the number of pulses per second; enables them to be converted to rpms. • Ranges: 500, 5 k, 50 k, 500 k Revolutions/F.S.
	Counts mode (electric meters, etc.) • Function: Displays a count of the number of pulses for each sampling interval from the start of measurement. • Ranges: 50 k, 500 k, 5 M, 50 M, 500 M C/F.S.
	Inst. mode • Function: Counts the number of pulses for each sampling interval. Resets the count value after each sampling interval. • Ranges: 50 k, 500 k, 5 M, 50 M C/F.S.
	Maximum number of pulse inputs • Counts, Inst. modes: 50 k/sampling interval • Revolutions: 50 k/s

5.3 Accessory/Option Specifications

Control Software

Item	Description
Compatible operating system	Windows 2000/XP
Functions	Main unit control, realtime data capture, data conversion
Main unit settings	Input settings, memory settings, alarm settings, trigger settings
Captured data	Realtime data (CSV, Binary) Memory data (CSV, Binary) PC card data
Display	Analog waveforms, logic waveforms, pulse waveforms, digital values
Display modes	Waveform View, Digital View, Meter View, Report View
File conversion	Between cursors, All data
Monitor functions	Alarm monitor enables sending of email to the specified address
Dual-screen function	Displays the current data alongside past data
Report function	Automatic creation of daily or monthly files
Maximum/Minimum	The maximum, minimum and current values are displayed during measurement

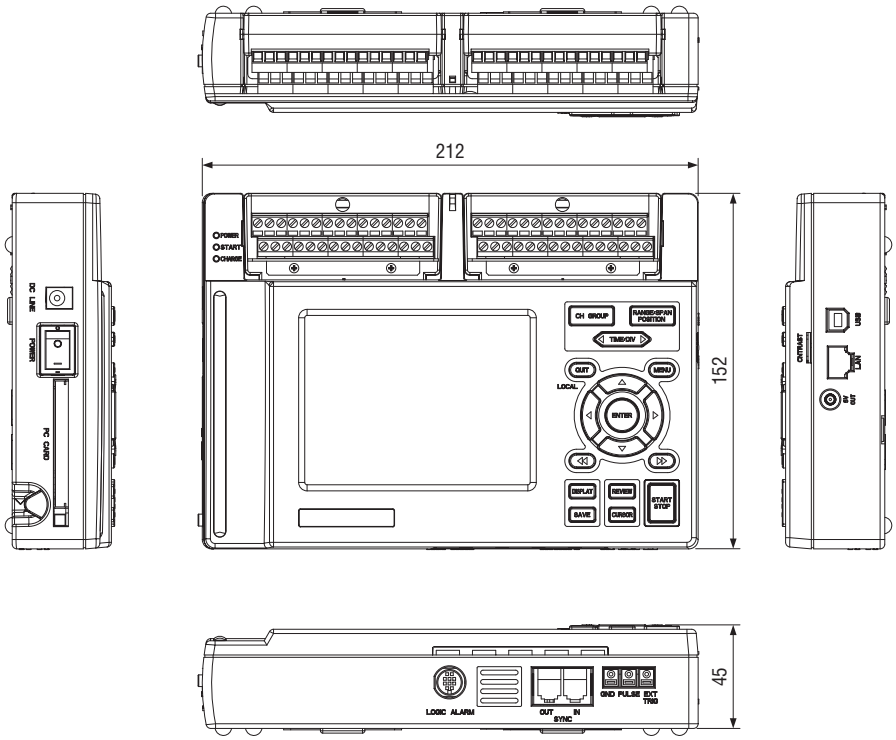
Battery Pack (Option)

Item	Description
Capacity	7.4 V/2200 mAh; mounted in the main unit
Running time	When using the LCD display: approx. 2 hour or more When using the screensaver: approx. 3 hours or more ***Note: The running time depends on the operating environment and the amount of charge left in the battery.***
Battery type	Lithium secondary battery
Charging method	Mount in the main unit, or use a separate battery charger ***Note: If mounted in the main unit for charging, the power switch must be turned off.***
Time required for charging	Main unit: approx. 4 hours
Switchover in the case of a power failure	Because the battery is used together with the AC adapter, the power supply will be switched automatically to the battery in the event of a power failure. ***Note: The AC adapter is the primary power source.***
Other functions	When the battery is running low, memory data is saved automatically to the PC card. When data is being saved directly to the PC card, the file is closed automatically.

Humidity Sensor B-530 (Option)

Item	Description
Allowable temperature range	-25 to +80°C
Allowable humidity range	0 to 100% RH
Relative humidity measurement accuracy	±3% RH (5 to 98% RH at 25°C)
Response time	15 s (90% response when membrane filter installed)
Sensor output	0 to 1 VDC
External dimensions	ϕ14 mm x 80 mm (excluding cable)
Cable length	3 m

5.4 External Dimensions



Dimensional precision: ±5 mm
Unit: mm

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The specifications, etc., in this manual are subject to change without notice.

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GRAPHTEC CORPORATION
503-10 Shinano-cho, Totsuka-ku,
Yokohama 244-8503, Japan
Tel : +81(045)825-6250
Fax: +81(045)825-6396
Email: info@graphteccorp.com
Web : www.graphteccorp.com

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